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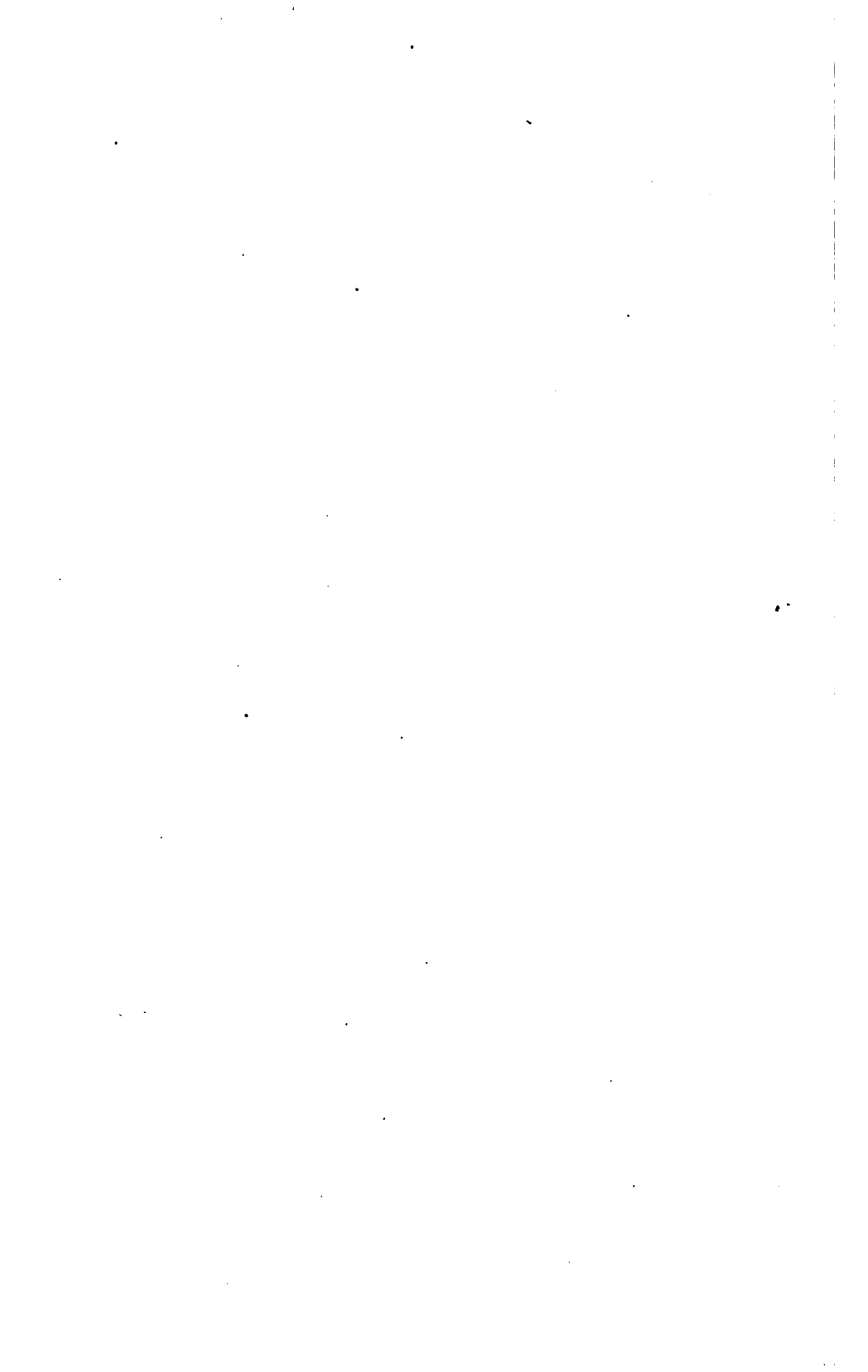
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SOLUBILITIES

OF

INORGANIC AND ORGANIC SUBSTANCES

*A HANDBOOK OF THE MOST RELIABLE
QUANTITATIVE SOLUBILITY
DETERMINATIONS*

RECALCULATED AND COMPILED BY

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PREFACE

DURING the years which have elapsed since Professor Arthur M. Comey's admirable "Dictionary of Chemical Solubilities" went to press (March, 1894), the literature upon solubilities has grown to such an extent that it has appeared desirable to make a new compilation of it. Soon after beginning work upon this volume the author realized that it would not be possible to prepare a compilation of solubility results which would fulfill completely the various requirements of theoretical, technical, analytical, and other classes of chemists, and he has therefore endeavored to meet some of the needs of all chemists rather than provide information especially arranged for any particular class.

The following features have been considered of chief importance in preparing the present compilation: completeness of the data, reliability of the determinations, uniformity in expression of results, convenience of arrangement of material, and the indexing of the cross-references to tables.

The material has been collected almost entirely from the original sources, and not from text-books or works of reference. The plan followed has been to search diligently the tables of contents or indices of twenty-five of the principal chemical journals issued since 1875, and to consult all articles in these as well as in other journals to which references could be obtained. In this connection, however, it should be stated that indexed references to work on solubility usually appear under the name of the substance employed, and not under the heading "solubility." Furthermore, solubility determinations are often incidental to other investigations, and consequently are not indicated in the title of the article or included in the index of the journal. Considering these difficulties there can be little hope of making such a compilation complete in every detail, and in the present case the best that can be said is that an earnest effort has been made to omit nothing of importance. This has been done not only for the author's personal satisfaction in perfecting the work, but also to give the reader a reasonable assurance that the absence from these pages of results upon a particular substance is good evidence that such determinations of satisfactory reliability

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are not readily obtainable from the usually accessible chemical journals.

Although at the time Professor Comey compiled his book it appeared inadvisable to attempt, in the majority of cases, to select the most reliable determinations of the solubility of the same substance reported by different investigators, the present author believes that this can now be done with advantage. The selections have been made in all cases by calculating the available determinations to a common basis and drawing curves through the points plotted on cross-section paper. A comparison of the curves, together with a study of the details of the methods by which the determinations were made in the several cases, has usually furnished clear evidence for a reliable selection. For some substances, however, this plan could not be followed, and it has therefore been necessary to present two or more sets of disagreeing results.

In many instances the calculations and study necessary to ascertain the most reliable figures have required much labor, and perhaps in some cases the author has not succeeded in selecting the ones nearest the truth; but it is believed that the economy of space required to present the material, and the saving of the time of the reader in making the necessary selections himself, will far overbalance the disadvantage resulting from the accidental inaccuracies introduced through extended computations.

An additional advantage resulting from the recalculation of different determinations to a common basis is the increased uniformity in the expression of results throughout the volume. On this account it has been possible to give the solubility of most substances for regular intervals of temperature and in terms of weight of dissolved substance per given weight of solvent or of solution.

Quantitative results alone have been included in this compilation, since it is assumed that qualitative determinations, if desired, can be readily made by simple tests in the laboratory, and therefore the effort necessary to collect such observations from the literature is out of proportion to the value of the information obtained.

In regard to the names and formulas of the compounds included, the author wishes to say that they are, for the most part, given as found in the original papers from which they were taken; and in some cases a lack of uniformity in the manner of their

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expression will be noted. This is especially true of the molecules of water of crystallization in the formulas given in connection with the guide names placed in heavy type at the head of the tables for all substances considered. As is well known, many compounds, besides gaining or losing water in air, also crystallize with different numbers of molecules of water even at the ordinary temperature, and it was therefore thought best to include such information at the proper place in the tables under the heading "Solid Phase" rather than to select in doubtful cases the number of molecules of water which the particular substance was considered to carry under ordinary conditions.

Although the arrangement of the material is alphabetical according to the customary English names, an index has been added which also provides for those cases where there appears a doubt as to which name is preferable, and furnishes cross-references to those tables which contain results upon more than one substance.

A glance through the pages of this book will show the incompleteness of the data for many of the most common chemical compounds. Furthermore many of the results given are of doubtful accuracy, although the best available. It is hoped, therefore, that a realization of the present incomplete state of our information concerning solubilities as evidenced in these pages will stimulate investigations of many of those substances which have hitherto been studied incompletely or not at all.

This volume went to press January 1st, 1907, and the subject matter is brought up to November, 1906.

In conclusion, the author begs all indulgence for errors and omissions, and will thank any one for calling them to his attention or making suggestions such as would improve a possible future edition of this "Handbook."

A. S.

WASHINGTON, D.C., *Feb. 22, 1907.*

ABBREVIATIONS

Abs. — Absolute.
Abs. Coef. — Absorption Coefficient.
Aq. or aq. — Aqueous.
At. — Atmosphere.
b. pt. — Boiling Point.
cc. — Cubic Centimeter.
conc. — Concentrated.
d. — Dextro.
d_p — Density.
f. pt. — Freezing Point.
G., g., or gm. — Gram.
Gms. or gms. — Grams.
G.M. or Gm. Mol. — Gram Molecule.
l. — Laevo.
m. — Meta.
Mg. or mg. — Milligram.
Mgs. or mgs. — Milligrams.
Mg. Mol. — Milligram Molecule.
Millimols. — Milligram Molecules.
Mol. — Molecule.
m. pt. — Melting Point.
N. or n. — Normal.
o. — Ortho.
ord. — Ordinary.
p. — Para.
ppt. — Precipitate.
pptd. — Precipitated.
pt. — Part.
sat. — Saturated.
sol. — Solution.
Sp. Gr. — Specific Gravity.
t[°] — Temperature in degrees C.
temp. — Temperature.
vol. — Volume.
wt. — Weight.

ABBREVIATIONS OF TITLES OF JOURNALS

- Am. Ch. J. The American Chemical Journal, Baltimore.
 Am. J. Sci. American Journal of Science and Arts, New Haven.
 Analyst. The Analyst, London.
 Ann. See Liebig's Ann.
 Ann. chim. anal. appl. Annales de chimie analytique appliquée, Paris.
 Ann. chim. phys. Annales de chimie et de physique, Paris.
 Ann. Physik. Annalen der Physik und Chemie, Leipzig. See also Pogg.
 Ann. and Wied. Ann.
 Apoth.-Ztg. Apotheker Zeitung, Berlin.
 Arch. Pharm. Archiv der Pharmacie, Halle.
 Ber. Berichte der deutschen chemischen Gesellschaft, Berlin.
 Biedermann's Centr. Biedermann's Centralblatt für Agrikulturchemie,
 u. s. w., Leipzig.
 Bull. soc. chim. Bulletin de la société chimique de Paris.
 Chem. Centralbl. Chemisches Centralblatt, Berlin.
 Chem. Ind. Die Chemische Industrie, Berlin.
 Chem. News. The Chemical News, London.
 Chem.-Ztg. Chemiker Zeitung, Cöthen.
 Compt. rend. Comptes rendus hebdomadaires des Seances de l'Académie
 des Sciences, Paris.
 Dinger pol. J. Dinger's polytechnisches Journal, Stuttgart.
 Gazz. chim. ital. Gazzeta chimica italiana, Palermo.
 Jahresber. Chem. Jahresbericht über die Fortschritte der Chemie, Giessen.
 J. Am. Chem. Soc. Journal of the American Chemical Society, Easton.
 J. Anal. Chem. The Journal of Analytical and Applied Chemistry, Easton.
 J. Chem. Soc. Journal of the Chemical Society of London.
 J. pharm. chim. Journal de pharmacie et de chimie, Paris.
 J. Physic. Chem. Journal of Physical Chemistry, Cornell.
 J. pr. Chem. Journal für praktische chemie, Leipzig.
 J. russ. phys. chem. Ges. Journal of the Russian Chemical Society, St.
 Petersburg.
 J. Soc. Chem. Ind. Journal of the Society of Chemical Industry, London.
 Landw. Vers-Stat. Landwirthschaftlichen Versuchs-Stationen, Berlin.
 Liebig's Annalen. Justus Liebig's Annalen der Chemie, Leipzig.
 Monatsh. Ch. Monatshefte für Chemie, u. s. w., Vienna.
 Mon. Sci. Le Moniteur Scientifique, Paris.
 Mulder. Scheikundige Verhandelingen en Onderzoekingen, Vol. 3. Pt. 3.
 Bijdragen tot de Geschiedenis van Het Scheikungig Gebonden Water by
 G. J. Mulder, Rotterdam, 1864.
 Pharm. J. Pharmaceutical Journal and Transactions, London.
 Phil. Mag. The Philosophical Magazine, London.
 Physic. Rev. Physical Review, Cornell.
 Pogg. Ann. Annalen der Physik und Chemie, edited by Poggendorf. See
 also Ann. Physik und Wied. Ann.
 Proc. Am. Acad. Proceedings of the American Academy of Arts and
 Sciences, Boston.
 Proc. Roy. Soc. Proceedings of the Royal Society of London.
 Rec. trav. chim. Recueil des travaux chimiques des Pays-Bas, Leiden.
 Sitzber. Akad. Wiss. Berlin. Sitzungsberichte der königlichen preussischen
 Akademie der Wissenschaften zu Berlin.
 Sitzber. Akad. Wiss. Wien. Sitzungsberichte der mathematische naturwissen-
 schaftlichen classe der kaiserlichen Akademie der Wissenschaften zu
 Wien.
 U. S. P. Pharmacopœia of the United States, 8th Revision, 1900.

ABBREVIATIONS OF TITLES OF JOURNALS

- Wied. Ann. Annalen der Physik und Chemie, edited by Wiederman. See also Pogg. Ann. and Ann. Physik.
Wiss. Abh. p. t. Reichanstalt. Wissenschaftlichen Abhandlung der physikalische technische Reichstalt, Charlottenburg.
Z. anal. Chem. Zeitschrift für analytische Chemie, Wiesbaden.
Z. angew. Chem. Zeitschrift für angewandte Chemie, Berlin.
Z. anorg. Chem. Zeitschrift für anorganische Chemie, Hamburg and Leipzig.
Z. Elektrochem. Zeitschrift für Elektrochemie, Halle.
Z. Krystallogr. Zeitschrift für Krystallographie und Mineralogie, Leipzig.
Z. physik. Chem. Zeitschrift für physikalische Chemie, Leipzig.
Z. Ver. Zuckerind. Zeitschrift für Rubenzucker-Industrie, Berlin.

The above abbreviations with a few necessary exceptions are taken from the list adopted by the editor of the *Journal of the American Chemical Society* for the new abstract journal, "Chemical Abstracts," and will in general be familiar to many of those who use this volume. In a large number of instances Chem. has contracted to Ch., but with this exception, and possibly a few inaccuracies which have slipped in, the abbreviations of journal titles used in this book conform to the above list.



ACENAPHTHENE

ACENAPHTHENE $C_{12}H_{10}$.

SOLUBILITY IN SEVERAL ORGANIC SOLVENTS.

(Speyers — Am. J. Sci. [4] 14, 294, 1902.)

NOTE. — In the original paper the results are given in terms of gram molecules of acenaphthene, acetamid, acetanilid, etc., per 100 gram molecules of solvent, at temperatures which varied with each solvent and with each weighing of the solutions. The tabulated results here given were obtained by recalculating and reading the figures from curves plotted on cross-section paper.

| t °. | In Methyl Alcohol. | | | In Ethyl Alcohol. | | | In Propyl Alcohol. | | |
|------|--------------------|-------|------|-------------------|------|-------|--------------------|-------|-------|
| | (a)* | (b)* | (c)* | (a) | (b) | (c) | (a) | (b) | (c) |
| 0 | 81.33 | 1.80 | 0.39 | 81.1 | 1.9 | 0.57 | 82.3 | 2.26 | 0.88 |
| 10 | 80.40 | 1.70 | 0.38 | 80.3 | 2.8 | 0.84 | 81.8 | 2.40 | 1.00 |
| 20 | 79.60 | 2.25 | 0.48 | 79.6 | 4.0 | 1.20 | 81.4 | 3.40 | 1.35 |
| 30 | 79.00 | 3.50 | 0.72 | 79.1 | 5.6 | 1.70 | 80.9 | 4.75 | 1.90 |
| 40 | 78.45 | 6.00 | 1.20 | 78.7 | 8.4 | 2.60 | 80.6 | 7.10 | 2.90 |
| 50 | 78.15 | 9.00 | 1.77 | 78.8 | 13.2 | 3.90 | 80.7 | 11.10 | 4.40 |
| 60 | 78.30 | 11.70 | 2.35 | 79.4 | 23.2 | 7.00 | 81.5 | 19.60 | 8.20 |
| 70 | 78.60 | 14.30 | 2.90 | 80.75 | 40.5 | 12.50 | 83.9 | 37.00 | 16.20 |

| t °. | In Chloroform. | | | In Toluene. | | |
|------|----------------|------|------|-------------|-------|------|
| | (a) | (b) | (c) | (a) | (b) | (c) |
| 0 | 143.8 | 16.4 | 12.7 | 90.7 | 13.18 | 7.9 |
| 10 | 140.1 | 20.6 | 16.0 | 90.8 | 18.0 | 10.7 |
| 20 | 136.3 | 27.0 | 19.5 | 91.0 | 24.5 | 14.5 |
| 30 | 132.4 | 34.0 | 25.0 | 91.8 | 33.5 | 20.5 |
| 40 | 128.0 | 42.5 | 32.0 | 92.7 | 47.0 | 28.0 |
| 50 | 123.4 | 51.5 | 40.0 | 94.0 | 60.5 | 35.7 |
| 60 | 119.3 | 62.5 | 50.0 | 95.5 | 74.0 | 43.5 |
| 70 | ... | ... | ... | 97.2 | 89.0 | 52.5 |

ACETAMIDE $CH_3CO.NH_2$.

SOLUBILITY IN WATER AND IN ALCOHOL.

(Speyers.)

| t °. | In Water. | | | In Ethyl Alcohol. | | |
|------|-----------|-------|------|-------------------|------|------|
| | (a) | (b) | (c) | (a) | (b) | (c) |
| 0 | 105.5 | 70.8 | 29.6 | 85.62 | 17.3 | 18.5 |
| 10 | 104.9 | 81.0 | 34.0 | 86.2 | 24.0 | 26.0 |
| 20 | 104.3 | 97.5 | 40.8 | 87.3 | 31.5 | 33.8 |
| 30 | 103.7 | 114.0 | 47.7 | 88.8 | 40.5 | 43.0 |
| 40 | 103.0 | 133.0 | 55.5 | 90.7 | 50.0 | 53.5 |
| 50 | 102.3 | 154.0 | 64.0 | 93.0 | 61.0 | 64.5 |
| 60 | 101.6 | 177.5 | 74.0 | 95.5 | 72.0 | 76.5 |

ACETANILIDE $C_6H_5NH.COCH_3$.

100 grams H_2O dissolve 0.55 gram at 25°, and 5.55 grams at b. pt.

- * (a) Weight of 100 cc. solution in grams. * (b) Grams dissolved substance per 100 grams solvent.
 * (c) Gram molecules of dissolved substance per 100 gram molecules of solvent.

ACETANILIDE

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SOLUBILITY OF ACETANILIDE IN ORGANIC SOLVENTS.

(Speyers.)

| t°. | In Methyl Alcohol. | | | In Ethyl Alcohol. | | | In Chloroform. | | |
|-----|--------------------|-------|------|-------------------|------|------|----------------|-------|-------|
| | (a) | (b) | (c) | (a) | (b) | (c) | (a) | (b) | (c) |
| 0 | 86.0 | 22.7 | 5.4 | 84.2 | 14.7 | 5.0 | 150.3 | 3.66 | 3.24 |
| 10 | 86.4 | 30.0 | 7.0 | 84.4 | 20.0 | 6.6 | 147.5 | 7.80 | 7.00 |
| 20 | 87.5 | 41.0 | 9.8 | 85.0 | 27.0 | 9.0 | 144.0 | 12.00 | 10.50 |
| 30 | 89.2 | 54.0 | 13.2 | 86.0 | 36.0 | 12.2 | 139.8 | 17.0 | 15.0 |
| 40 | 91.1 | 75.5 | 18.0 | 87.4 | 49.0 | 16.2 | 135.4 | 23.0 | 20.4 |
| 50 | 93.2 | 107.0 | 25.2 | 89.5 | 65.0 | 22.0 | 131.4 | 31.0 | 27.6 |
| 60 | 95.7 | 145.0 | 34.0 | 92.0 | 87.0 | 30.0 | 127.2 | 41.0 | 36.0 |

SOLUBILITY IN MIXTURES OF ETHYL ALCOHOL AND WATER AT 25°.

(Holleman and Antusch — Rec. trav. chim 13, 293, 1894.)

| Vol. % Alcohol. | Gms. C ₆ H ₅ NO per 100 Gms. Solvent. | Sp. Gr. | Vol. % Alcohol. | Gms. C ₆ H ₅ NO per 100 Gms. Solvent. | Sp. Gr. |
|--------------------|--|---------|--------------------|--|---------|
| 100 | 32.93 | 0.8512 | 55 | 13.13 | 0.9335 |
| 95 | 36.65 | 0.8737 | 50 | 9.74 | 0.9396 |
| 93 | 38.04 | 0.8813 | 45 | 7.25 | 0.9449 |
| 90 | 38.20 | 0.8896 | 40 | 5.10 | 0.9508 |
| 87 | 37.80 | 0.8959 | 35 | 3.58 | 0.9567 |
| 85 | 36.83 | 0.8996 | 31 | 2.56 | 0.9617 |
| 80 | 33.62 | 0.9072 | 25 | 1.73 | 0.9683 |
| 75 | 29.25 | 0.9133 | 20 | 1.30 | 0.9736 |
| 70 | 24.73 | 0.9185 | 15 | 1.03 | 0.9795 |
| 65 | 20.42 | 0.9185 | 10 | 0.94 | 0.9845 |
| 60 | 16.51 | 0.9287 | 0 | 0.54 | 0.9970 |

ACETIC ACID CH₃COOH.

SOLUBILITY IN WATER.

(Dahms — Ann. Phys. [4] 60, 122, '97.)

| t°. | Gms. CH ₃ COOH per 100 Gms. Solution. | Solid Phase. | t°. | Gms. CH ₃ COOH per 100 Gms. Solution. | Solid Phase. |
|-------|---|----------------------------|------|---|----------------------|
| -5 | 15.1 | Ice | -20 | 66.3 | CH ₃ COOH |
| -10 | 28.2 | | -10 | 76.7 | " |
| -15 | 39.5 | | 0 | 87.0 | " |
| -20 | 49.5 | | +10 | 90.8 | " |
| -25 | 57.0 | | 16.5 | 100.0 tr. pt. | " |
| -26.6 | 58.9 | Ice + CH ₃ COOH | | | |

DISTRIBUTION OF ACETIC ACID BETWEEN:

Water and Amyl Alcohol at 20°.

(Herz and Fischer — Ber. 37, 4747, '04)

| Gms. CH ₃ COOH per 100 cc. | | G. M. CH ₃ COOH per 100 cc. | |
|--|------------------|---|------------------|
| H ₂ O Layer. | Alcoholic Layer. | H ₂ O Layer. | Alcoholic Layer. |
| 1 | 0.923 | 0.01 | 0.0095 |
| 2 | 1.847 | 0.03 | 0.0280 |
| 3 | 2.741 | 0.05 | 0.0460 |
| 4 | 3.694 | 0.07 | 0.0645 |
| 5 | 4.587 | 0.09 | 0.0830 |
| 6 | 5.475 | 0.11 | 0.1010 |
| 7 | 6.434 | 0.13 | 0.1190 |
| 8 | 7.328 | ... | ... |

Water and Benzene at 25°.

(H. and F. — Ber. 38, 1140, '05.)

| Gms. CH ₃ COOH per 100 cc. | | G. M. CH ₃ COOH per 100 cc. | |
|--|--------------------------------------|---|--------------------------------------|
| H ₂ O Layer. | C ₆ H ₆ Layer. | H ₂ O Layer. | C ₆ H ₆ Layer. |
| 5 | 0.130 | 0.05 | 0.0014 |
| 10 | 0.417 | 0.10 | 0.0005 |
| 20 | 55 | 0.20 | 0.0030 |
| 30 | 3.03 | 0.30 | 0.0290 |
| 40 | 4.95 | 0.50 | 0.051 |
| .. | ... | 0.70 | 0.090 |

DISTRIBUTION OF ACETIC ACID BETWEEN WATER AND BENZENE.

(Waddell — J. Phys. Ch. 2, 237, 1898.)

Results in terms of grams per 100 grams solution.

| t°. | Upper Layer. | | | Lower Layer. | | |
|-----|-----------------------|---------------------------------|-------------------|-----------------------|---------------------------------|-------------------|
| | CH ₃ COOH. | C ₆ H ₆ . | H ₂ O. | CH ₃ COOH. | C ₆ H ₆ . | H ₂ O. |
| 25 | 0.46 | 99.52 | 0.02 | 9.4 | 0.18 | 90.42 |
| 25 | 3.10 | 96.75 | 0.15 | 28.2 | 0.53 | 71.27 |
| 25 | 5.20 | 94.55 | 0.25 | 37.7 | 0.84 | 61.46 |
| 25 | 8.7 | 90.88 | 0.42 | 48.3 | 1.82 | 49.88 |
| 25 | 16.3 | 82.91 | 0.79 | 61.4 | 6.1 | 32.5 |
| 25 | 30.5 | 67.37 | 2.13 | 66.0 | 13.8 | 20.2 |
| 25 | 52.5 | 39.60 | 7.60 | 52.8 | 39.6 | 7.6 |
| 35 | 1.2 | 98.68 | 0.08 | 16.4 | 0.62 | 89.98 |
| 35 | 5.7 | 93.97 | 0.33 | 36.8 | 1.42 | 62.78 |
| 35 | 9.0 | 90.42 | 0.58 | 49.0 | 2.10 | 48.90 |
| 35 | 45.0 | 49.00 | 6.0 | 61.3 | 25.5 | 13.2 |
| 35 | 52.2 | 39.4 | 8.4 | 52.2 | 39.4 | 8.4 |

DISTRIBUTION OF ACETIC ACID BETWEEN WATER AND CHLOROFORM:

At Room Temperature.

(Wright, Thomson and Leon — Proc. Roy. Soc. 49, 185, 1891.)

At 25°.

(Herz and Lewy; Rothmund and Wilsmore.)

| Results in parts per 100 parts of solution. | | | | | | Gms. CH ₃ COOH per 100 cc. | | G. M. CH ₃ COOH per 100 cc. | |
|---|---------------------|-------------------|-----------------------|---------------------|-------------------|---------------------------------------|--------------------------|--|--------------------------|
| Upper Layer. | | | Lower Layer. | | | H ₂ O Layer. | CHCl ₃ Layer. | H ₂ O Layer. | CHCl ₃ Layer. |
| CH ₃ COOH. | CHCl ₃ . | H ₂ O. | CH ₃ COOH. | CHCl ₃ . | H ₂ O. | | | | |
| 0 | 0.84 | 99.16 | 0 | 99.01 | 0.99 | 2 | 0.089 | 0.05 | 0.0032 |
| 6.46 | 0.92 | 92.62 | 1.04 | 98.24 | 0.72 | 4 | 0.313 | 0.075 | 0.0062 |
| 17.69 | 0.79 | 81.52 | 3.83 | 94.98 | 1.19 | 6 | 0.596 | 0.100 | 0.0100 |
| 25.10 | 1.21 | 73.69 | 6.77 | 91.85 | 1.38 | 8 | 0.974 | 0.150 | 0.0198 |
| 33.71 | 2.97 | 63.32 | 11.05 | 87.82 | 1.13 | 10 | 1.430 | 0.175 | 0.0260 |
| 44.12 | 7.30 | 48.58 | 17.72 | 80.00 | 2.28 | 12 | 1.982 | 0.200 | 0.0325 |
| 50.18 | 15.11 | 34.71 | 25.75 | 70.13 | 4.12 | 20 | 5.10 | 0.30 | 0.070 |
| | | | | | | 30 | 10.2 | 0.50 | 0.170 |
| | | | | | | 40 | 15.3 | 0.70 | 0.275 |
| | | | | | | 50 | 21.9 | 0.80 | 0.335 |
| | | | | | | 52.3 | 39.54 | 0.87 | 0.659 |

The figures in the table for 25° were read from the curve plotted from the results of H. and L., Z. electro. Ch. 11, 818, 1905, and of R. and W., Z. phys. Ch. 40, 623, 1902.

The influence of electrolytes upon the distribution of acetic acid between the aqueous and chloroform layers was investigated by Rothmund and Wilsmore, and the following results expressed in gram molecules per liter at 25° were obtained:

| Electro-lyte. | Conc. of Electrolyte | | Conc. of CH ₃ COOH in | | Conc.* CH ₃ COOH | Electro-lyte. | Conc. of Electrolyte | | Conc. of CH ₃ COOH in | | Conc.* CH ₃ COOH |
|------------------|----------------------|--------------------------|----------------------------------|--------------------------|----------------------------------|---------------|----------------------|--------------------------|----------------------------------|--------------------------|-----------------------------|
| | Aq. Layer. | CHCl ₃ Layer. | Aq. Layer. | CHCl ₃ Layer. | | | Aq. Layer. | CHCl ₃ Layer. | Aq. Layer. | CHCl ₃ Layer. | |
| HCl | 0.463 | 0.876 | 0.0907 | 0.946 | ½ H ₂ SO ₄ | 0.514 | 1.099 | 0.1315 | 1.168 | | |
| " | 0.463 | 1.538 | 0.2435 | 1.680 | | 1.029 | 1.555 | 0.2714 | 1.787 | | |
| " | 0.926 | 0.813 | 0.0938 | 0.966 | | | | | | | |
| " | 0.926 | 1.586 | 0.2902 | 1.858 | NH ₄ NO ₃ | 1.0 | 1.136 | 0.1313 | 1.168 | | |
| HNO ₃ | 0.316 | 0.936 | 0.0927 | 0.958 | " | 1.0 | 1.991 | 0.3481 | 2.053 | | |
| " | 0.316 | 1.694 | 0.2537 | 1.720 | LiNO ₃ | 1.0 | 0.892 | 0.1005 | 1.000 | | |
| " | 0.633 | 0.965 | 0.0981 | 0.988 | " | 1.0 | 1.513 | 0.2581 | 1.737 | | |
| " | 0.633 | 1.631 | 0.2486 | 1.702 | | | | | | | |

* Calculated from table above.

DISTRIBUTION OF ACETIC ACID AT 25° BETWEEN:

Water and Carbon Bisulphide.

(Herz and Lewy.)

| Gms. CH_3COOH per 100 cc. | | G. M. CH_3COOH per 100 cc. | |
|--|-------------------------|---|-------------------------|
| H_2O Layer. | CS_2 Layer. | H_2O Layer. | CS_2 Layer. |
| 65 | 2.64 | 1.1 | 0.45 |
| 70 | 3.0 | 1.2 | 0.55 |
| 75 | 3.3 | 1.2 | 0.80 |
| 80 | 5.4 | 1.35 | 0.97 |
| 85 | 6.4 | 1.4 | 1.3 |

Water and Carbon Tetrachloride.

(Herz and Lewy.)

| Gms. CH_3COOH per 100 cc. | | G. M. CH_3COOH per 100 cc. | |
|--|--------------------------|---|--------------------------|
| H_2O Layer. | CCl_4 Layer. | H_2O Layer. | CCl_4 Layer. |
| 30 | 1.8 | 0.5 | 0.03 |
| 40 | 3.0 | 0.7 | 0.055 |
| 50 | 4.8 | 0.9 | 0.095 |
| 60 | 5.8 | 1.1 | 0.155 |
| 70 | 12.0 | 1.2 | 0.235 |
| 76.2 | 25.2 | 1.27 | 0.420 |

DISTRIBUTION OF ACETIC ACID AT 25° BETWEEN:

Water and Bromoform.

(H. and L. — Z. electro. Ch. 11, 818, '05.)

| Gms. CH_3COOH per 100 cc. | | G. M. CH_3COOH per 100 cc. | |
|--|---------------------------|---|---------------------------|
| H_2O Layer. | CHBr_3 Layer. | H_2O Layer. | CHBr_3 Layer. |
| 20 | 1.5 | 0.4 | 0.035 |
| 30 | 3.0 | 0.6 | 0.070 |
| 40 | 4.8 | 0.8 | 0.120 |
| 50 | 7.8 | 1.0 | 0.20 |
| 60 | 12.0 | 1.1 | 0.28 |
| 65 | 15.6 | 1.15 | 0.395 |
| 70 | 27.0 | ... | ... |

Water and Toluene.

(H. and F. — Ber. 38, 1140, '05.)

| Gms. CH_3COOH per 100 cc. | | G. M. CH_3COOH per 100 cc. | |
|--|---|---|---|
| H_2O Layer. | $\text{C}_6\text{H}_5\text{CH}_3$ Layer. | H_2O Layer. | $\text{C}_6\text{H}_5\text{CH}_3$ Layer. |
| 5 | 0.119 | 0.1 | 0.0025 |
| 10 | 0.328 | 0.2 | 0.0075 |
| 20 | 1.132 | 0.4 | 0.0260 |
| 30 | 2.265 | 0.6 | 0.0530 |
| 40 | 3.725 | 0.8 | 0.090 |
| 50 | 5.841 | 1.0 | 0.140 |
| 60 | 8.344 | ... | ... |

DISTRIBUTION OF ACETIC ACID AT 25° BETWEEN:

Water and *o* or *p* Xylene.

(Herz and Fischer.)

| Gms. CH_3COOH per 100 cc. | | G. M. CH_3COOH per 100 cc. | |
|--|--|---|--|
| H_2O Layer. | <i>o</i> or <i>p</i> Xylene Layer. | H_2O Layer. | <i>o</i> or <i>p</i> Xylene Layer. |
| 5 | 0.24 | 0.1 | 0.004 |
| 10 | 0.48 | 0.2 | 0.010 |
| 20 | 1.13 | 0.4 | 0.025 |
| 30 | 2.15 | 0.6 | 0.047 |
| 40 | 3.40 | 0.8 | 0.079 |
| 50 | 5.10 | 1.0 | 0.122 |
| 60 | 7.27 | 1.2 | 0.230 |
| 70 | 12.52 | ... | ... |

Water and *m* Xylene.

(Herz and Fischer.)

| Gms. CH_3COOH per 100 cc. | | G. M. CH_3COOH per 100 cc. | |
|--|------------------------------|---|------------------------------|
| H_2O Layer. | <i>m</i> Xylene Layer. | H_2O Layer. | <i>m</i> Xylene Layer. |
| 5 | 0.06 | 0.1 | 0.0015 |
| 10 | 0.30 | 0.2 | 0.007 |
| 20 | 0.95 | 0.4 | 0.022 |
| 30 | 1.91 | 0.6 | 0.042 |
| 40 | 3.04 | 0.8 | 0.072 |
| 50 | 4.65 | 1.0 | 0.111 |
| 60 | 6.65 | 1.2 | ... |

NOTE. — The distribution results as presented in the original papers to which references are given in the above tables, are reported in millimolecules per 10 cc. portions of each layer in the several cases. To obtain the figures given in the above tables, the original results before and after calculating to gram quantities were plotted on cross-section paper, and from the curves thus obtained, readings for regular intervals of concentration of acetic acid in the aqueous layer were selected.

Chlor ACETIC ACID CH_2ClCOOH .

DISTRIBUTION OF CHLOR ACETIC ACID BETWEEN:

(Herz and Fischer.)

| Water and Benzene at 25°. | | | | Water and Toluene at 25°. | | | |
|--|----------------------------------|---|----------------------------------|--|---|---|---|
| Gms. CH_2ClCOOH per 100 cc. | | G. M. CH_2ClCOOH per 100 cc. | | Gms. CH_2ClCOOH per 100 cc. | | G. M. CH_2ClCOOH per 100 cc. | |
| H_2O Layer. | C_6H_6 Layer. | H_2O Layer. | C_6H_6 Layer. | H_2O Layer. | $\text{C}_6\text{H}_5\text{CH}_3$ Layer. | H_2O Layer. | $\text{C}_6\text{H}_5\text{CH}_3$ Layer. |
| 0.25* | 8.69 | 0.0025 | 0.090 | 0.1* | 5.22 | 0.001 | 0.055 |
| 0.5 | 15.59 | 0.005 | 0.155 | 0.5 | 20.31 | 0.005 | 0.20 |
| 1.0 | 27.87 | 0.010 | 0.28 | 1.0 | 34.87 | 0.010 | 0.36 |
| 1.5 | 41.10 | 0.015 | 0.415 | 1.5 | 49.14 | 0.015 | 0.50 |
| 2.0 | 52.90 | 0.02 | 0.54 | 2.0 | 60.46 | 0.02 | 0.62 |
| 3.0 | 68.01 | 0.03 | 0.70 | 3.0 | 72.28 | 0.03 | 0.77 |
| 4.0 | 76.52 | 0.04 | 0.79 | 4.0 | 81.72 | 0.04 | 0.85 |
| | | | | 5.0 | 86.94 | 0.05 | 0.90 |

DISTRIBUTION OF CHLOR ACETIC ACID BETWEEN:

(Herz and Lewy.)

| Water and Chloroform at 25°. | | | | Water and Bromoform at 25°. | | | |
|--|---------------------------|---|---------------------------|--|---------------------------|---|---------------------------|
| Gms. CH_2ClCOOH per 100 cc. | | G. M. CH_2ClCOOH per 100 cc. | | Gms. CH_2ClCOOH per 100 cc. | | G. M. CH_2ClCOOH per 100 cc. | |
| H_2O Layer. | CHCl_3 Layer. | H_2O Layer. | CHCl_3 Layer. | H_2O Layer. | CHBr_3 Layer. | H_2O Layer. | CHBr_3 Layer. |
| 5* | 0.283 | 0.05 | 0.0025 | 40* | 0.850 | 0.45 | 0.011 |
| 10 | 0.614 | 0.10 | 0.0060 | 50 | 1.889 | 0.50 | 0.0165 |
| 20 | 1.088 | 0.20 | 0.0135 | 60 | 2.994 | 0.60 | 0.028 |
| 40 | 2.948 | 0.40 | 0.029 | 70 | 4.241 | 0.70 | 0.040 |
| 50 | 3.684 | 0.60 | 0.045 | 80 | 5.620 | 0.80 | 0.053 |
| 60 | 4.440 | 0.70 | 0.061 | 90 | 7.560 | 0.90 | 0.067 |
| 70 | 7.086 | 0.75 | 0.077 | 91.6 | 11.340 | 0.97 | 0.120 |

DISTRIBUTION OF CHLOR ACETIC ACID BETWEEN:

(Herz and Lewy.)

| Water and Carbon Bisulphide at 25°. | | | | Water and Carbon Tetra- chloride at 25°. | | | |
|--|-------------------------|---|-------------------------|--|--------------------------|---|--------------------------|
| Gms. CH_2ClCOOH per 100 cc. | | G. M. CH_2ClCOOH per 100 cc. | | Gms. CH_2ClCOOH per 100 cc. | | G. M. CH_2ClCOOH per 100 cc. | |
| H_2O Layer. | CS_2 Layer. | H_2O Layer. | CS_2 Layer. | H_2O Layer. | CCl_4 Layer. | H_2O Layer. | CCl_4 Layer. |
| 60* | 0.426 | 0.6 | 0.0042 | 90* | 1.417 | 0.95 | 0.0150 |
| 80 | 0.691 | 0.8 | 0.007 | 95 | 2.031 | 1.00 | 0.0195 |
| 90 | 0.803 | 1.0 | 0.009 | 100 | 2.645 | 1.05 | 0.0270 |
| 100 | 1.040 | 1.05 | 0.0105 | 105 | 4.26 | 1.10 | 0.0415 |
| 105 | 1.464 | 1.10 | 0.015 | 106.7 | 5.19 | 1.13 | 0.0550 |
| 106.7 | 1.890 | 1.13 | 0.020 | | | | |

* See Note, page 4.

SOLUBILITY OF MONO CHLOR, DI CHLOR, AND OF TRI CHLOR ACETIC ACID IN AQUEOUS ALCOHOL.(Bancroft — *Phys. Rev.* 3, 193, 1895-96.)

| cc. Ethyl Alcohol in Mixtures. | cc. H ₂ O added to cause separation of a second phase in mixtures of the given amts. of Alcohol and 3 cc. of: | | |
|--------------------------------|--|-------------------------|------------------------|
| | CH ₃ ClCOOH. | CHCl ₂ COOH. | CCl ₃ COOH. |
| 3 | 1.32 | 0.96 | 0.65 |
| 6 | 4.01 | 2.45 | 1.80 |
| 9 | 7.30 | 4.33 | 3.02 |
| 12 | 10.78 | 6.60 | 4.50 |
| 15 | 16.16 | 9.20 | 6.50 |
| 18 | 22.16 | ... | ... |
| 21 | 28.74 | ... | ... |

ACETNAPHTHALIDE C₇H₅ONH(C₁₀H₇).**SOLUBILITY IN MIXTURES OF ALCOHOL AND WATER.**(Holleman and Antusch — *Rec. trav. chim.* 13, 280, 1894.)

| Vol. % Alcohol. | Gms. per 100 Gms. Solvent. | Sp. Gr. of Solutions. | Vol. % Alcohol. | Gms. per 100 Gms. Solvent. | Sp. Gr. of Solutions. |
|-----------------|----------------------------|-----------------------|-----------------|----------------------------|-----------------------|
| 100 | 4.02 | 0.7916 | 65 | 1.78 | 0.8977 |
| 95 | 4.31 | 0.8150 | 60 | 1.44 | 0.9091 |
| 90 | 4.11 | 0.8344 | 55 | 1.02 | 0.9201 |
| 85 | 3.69 | 0.8485 | 50 | 0.71 | 0.9290 |
| 80 | 3.18 | 0.8624 | 35 | 0.25 | 0.9537 |
| 75 | 2.73 | 0.8761 | 20 | 0.09 | 0.9717 |
| 70 | 2.31 | 0.8798 | 10 | 0.04 | 0.9841 |

ACETONE (CH₃)₂CO.**SOLUBILITY OF ACETONE IN AQUEOUS SOLUTIONS OF:**

Electrolytes.

Non-Electrolytes.

(Bell — *J. Phys. Ch.* 9, 544, 1905; Linebarger — *Am. Ch. J.* 14, 380, 1892.)

| Gms. Electrolyte per 100 Gms. Aq. Solution. | Gms. (CH ₃) ₂ CO per 100 Gms. Solvent in Solutions of: | | | | Gms. Non-Electrolyte per 100 Gms. Aq. Solution. | Gms. (CH ₃) ₂ CO per 100 Gms. Solvent in Solutions of: | | |
|---|---|---------------------------------|---|-------------------|---|---|---|-------|
| | K ₂ CO ₃ | Na ₂ CO ₃ | (NH ₄) ₂ CO ₃ | MgCO ₃ | | C ₁₀ H ₈ | Anethol.* (C ₆ H ₅) ₂ CO. | |
| 1.25 | ... | ... | ... | 83.5 | 5 | 92.5 | 103.0 | 90.0 |
| 2.50 | ... | 51.0 | 110.0 | 65.0 | 10 | 117.0 | 123.0 | 108.5 |
| 5.00 | 65.0 | 38.0 | 73.5 | 47.0 | 20 | 137.0 | 144.5 | 126.0 |
| 7.5 | 46.5 | 27.5 | 57.0 | 38.0 | 30 | 148.5 | 155.0 | 133.0 |
| 10.0 | 34.5 | 19.5 | 44.5 | 29.0 | 40 | 155.5 | 162.0 | 136.0 |
| 12.5 | 25.5 | 14.0 | 35.0 | ... | 50 | 159.5 | 166.0 | 135.5 |
| 15.0 | 18.0 | 9.0 | 28.0 | ... | 60 | 160.2 | 165.0 | 131.5 |
| 20.0 | 8.0 | 2.7 | ... | ... | 70 | 155.0 | 158.0 | 123.0 |
| 25.0 | 3.7 | ... | ... | ... | 80 | ... | ... | 108.5 |
| 30.0 | 1.6 | ... | ... | ... | 90 | ... | ... | 82.0 |

* Anethol = *p* Propenylanisol CH₃.CH:CH(C₆H₄)OCH₃.

NOTE. — The original results were recalculated and plotted on cross-section paper. From the curves so obtained the above table was constructed. See also Note, page 7.

SOLUBILITY OF ACETONE IN AQUEOUS SOLUTIONS OF CARBOHYDRATES.

(Krug and McElroy — J. Anal. Ch. 6, 184, '92; Bell — J. Phys. Ch. 9, 547, '05.)

In Aqueous Solutions of Cane Sugar.

| Per cent Sugar. | Gms. (CH ₃) ₂ CO per 100 Gms. Sugar Solution at: | | | | | |
|--------------------|---|------|-------|------|-------|------|
| | 15°. | 20°. | 25°. | 30°. | 35°. | 40°. |
| 10 | 597.2 | ... | 581.8 | ... | 574.8 | ... |
| 20 | 272.5 | ... | 250.0 | ... | 251.8 | ... |
| 30 | 172.4 | ... | 150.0 | ... | 150.6 | ... |
| 35 | ... | ... | ... | ... | ... | 110 |
| 40 | ... | 96.4 | 92.8 | 89.8 | ... | 85 |
| 45 | ... | 71.9 | 68.8 | 65.7 | ... | 62 |
| 50 | ... | 50.8 | 48.1 | 45.9 | ... | 42 |
| 55 | ... | 35.8 | 33.8 | 32.5 | ... | 29 |
| 60 | ... | 25.2 | 24.2 | 23.4 | ... | ... |
| 65 | ... | 18.3 | 17.7 | 17.0 | ... | ... |
| 70 | ... | 13.2 | 12.8 | 12.5 | ... | ... |

In Aqueous Dextrose Solutions.

| Per cent Dextrose. | Gms. (CH ₃) ₂ CO per 100 Gms. Solvent at: | | |
|-----------------------|---|-------|-------|
| | 15°. | 25°. | 35°. |
| 10 | 736.7 | 747.9 | 761.5 |
| 20 | 255.3 | 247.7 | 240.8 |
| 30 | 157.5 | 149.8 | 142.5 |
| 40 | 86.9 | 79.6 | 74.0 |
| 50 | 36.2 | 33.0 | 31.2 |

In Aqueous Maltose Solutions.

| Per cent Maltose. | Gms. (CH ₃) ₂ CO per 100 Gms. Solvent at: | | |
|----------------------|---|-------|-------|
| | 15°. | 25°. | 35°. |
| 10 | 353.6 | 348.1 | 342.0 |
| 20 | 185.4 | 181.2 | 176.9 |
| 30 | 119.9 | 116.0 | 112.4 |
| 40 | 78.4 | 74.7 | 70.5 |
| 50 | 46.2 | 42.9 | 39.8 |

NOTE. — The above determinations were made by adding successive small quantities of acetone to mixtures of known amounts of water and the carbohydrate, and noting the point at which a clouding due to the separation of a second phase occurred. This method was also used for the solubility of acetone in the aqueous electrolyte solutions (see previous page). In the case of the aqueous non-electrolyte solutions, however, successive small amounts of water were added to mixtures of known amounts of acetone and the non-electrolyte.

DISTRIBUTION OF ACETONE BETWEEN WATER AND BENZENE AT 25°.

(Herz and Fischer — Ber. 38, 1142, '05.)

| Gms. (CH ₃) ₂ CO per 100 cc. | | G. M. (CH ₃) ₂ CO per 100 cc. | |
|---|---|--|---|
| Aq. Layer. | C ₆ H ₆ Layer. | Aq. Layer. | C ₆ H ₆ Layer. |
| 1* | 1.20 | 0.025* | 0.025 |
| 5 | 4.17 | 0.05 | 0.047 |
| 10 | 10.15 | 0.10 | 0.075 |
| 15 | 15.59 | 0.15 | 0.150 |
| 20 | 22.50 | 0.20 | 0.215 |
| | | 0.25 | 0.275 |

* See Note, page 4.

ACET-PHENETIDIN *p* (PHENACETIN) $C_6H_4(OC_2H_5)NHCH_2CO$.

SOLUBILITY IN WATER, ALCOHOL, ETC.

(U. S. P.)

| t°. | Gms. $C_6H_4(OC_2H_5)NHCH_2CO$ per 100 Gms. | | | |
|--------|---|-----------------------------------|------------------------------------|---------------------|
| | H ₂ O. | C ₂ H ₅ OH. | (CH ₃) ₂ O. | CHCl ₃ . |
| 25 | 0.108 | 8.33 | 1.59 | 5.00 |
| b. pt. | 1.43 | 50.0 | ... | ... |

ACET-TOLUIDE *p* $CH_3.C_6H_4.NH.C_2H_5.O$.

SOLUBILITY IN MIXTURES OF ALCOHOL AND WATER.

(Holleman and Antusch — Rec. trav. chim. 13, 288, '94.)

| Vol. % Alcohol. | Gms. per 100 Gms. Solvent. | Sp. Gr. of Solutions. | Vol. % Alcohol. | Gms. per 100 Gms. Solvent. | Sp. Gr. of Solutions. |
|--------------------|----------------------------------|-----------------------------|--------------------|----------------------------------|-----------------------------|
| 100 | 10.18 | 0.8074 | 50 | 1.92 | 0.9306 |
| 95 | 10.79 | 0.8276 | 45 | 1.41 | 0.9380 |
| 90 | 10.62 | 0.8440 | 40 | 0.96 | 0.9460 |
| 85 | 9.62 | 0.8576 | 35 | 0.66 | 0.9544 |
| 80 | 8.43 | 0.8685 | 25 | 0.31 | 0.9668 |
| 75 | 7.04 | 0.8803 | 20 | 0.23 | 0.9725 |
| 70 | 5.81 | 0.8904 | 15 | 0.16 | 0.9780 |
| 65 | 4.39 | 0.9021 | 5 | 0.13 | 0.9903 |
| 60 | 3.59 | 0.9115 | 0 | 0.12 | 0.9979 |
| 55 | 2.69 | 0.9207 | | | |

ACETYLENE C_2H_2 .

SOLUBILITY IN WATER.

(Winkler; see Landolt and Börnstein's Tabellen, 3d ed. p. 604, '05.)

| t°. | a. | q. |
|-----|------|------|
| 0 | 1.73 | 0.20 |
| 5 | 1.49 | 0.17 |
| 10 | 1.31 | 0.15 |
| 15 | 1.15 | 0.13 |
| 20 | 1.03 | 0.12 |
| 25 | 0.93 | 0.11 |
| 30 | 0.84 | 0.09 |

a, "Absorption Coefficient," = the volume of gas (reduced to 0° and 760 mm. pressure) taken up by one volume of the liquid at the given temperature when the partial pressure of the gas equals 760 mm. mercury.

q, "Solubility," = the amount of gas in grams which is taken up by 100 grams of the pure solvent at the given temperature if the total pressure, *i.e.*, the partial pressure of the gas plus the vapor pressure of the liquid at the absorption temperature is 760 mm.

ACETYL ACETONE $\text{CH}_3\text{COCH}_2\text{COCH}_3$.

SOLUBILITY IN WATER.

(Rothmund — Z. phys. Ch. 26, 475, '98.)

| t°. | Gms. $\text{CH}_3\text{COCH}_2\text{COCH}_3$ per 100 Gms. | |
|--------------------|---|-----------------------|
| | H ₂ O Layer. | Acetyl Acetone Layer. |
| 30 | 15.46 | 95.02 |
| 40 | 17.58 | 93.68 |
| 50 | 20.22 | 91.90 |
| 60 | 23.23 | 89.41 |
| 70 | 27.10 | 85.77 |
| 80 | 33.92 | 78.82 |
| 87.7 (crit. temp.) | 56.8 | |

NOTE. — Weighed amounts of water and acetyl acetone were placed in small glass tubes, which were then sealed and slowly heated until the contained mixtures became homogeneous. The temperature was then allowed to fall very gradually and the point noted at which cloudiness appeared. This point was accurately established for each tube by repeated trials. The curve plotted from these determinations shows two percentage amounts of acetyl acetone which cause cloudiness at each temperature below the critical point. Of these two points, for each temperature, one represents the aqueous layer, *i.e.*, the solubility of acetyl acetone in water; and the other represents the acetyl acetone layer, *i.e.*, the solubility of water in acetyl acetone. This method is known as the "Synthetic Method," and yields results in harmony with those obtained by the analytical method, *i.e.*, by analyzing each layer after complete separation occurs.

ACONITINE (Amorphous) $\text{C}_{34}\text{H}_{47}\text{NO}_{11}$.

SOLUBILITY IN SEVERAL SOLVENTS.

(At 25° U.S.P.; at 18°-22°, Müller — Apoth.-Ztg. 18, 2, '03.)

| Solvent. | Gms. $\text{C}_{34}\text{H}_{47}\text{NO}_{11}$ per 100 Gms. Solvent at: | | Solvent. | Gms. $\text{C}_{34}\text{H}_{47}\text{NO}_{11}$ per 100 Gms. Solvent at: | |
|---------------|--|-------|----------------------|--|-------|
| | 18°-22°. | 25°. | | 18°-22°. | 25°. |
| Water . . . | 0.054 | 0.031 | Benzene | 17.85 | ... |
| Alcohol . . . | ... | 4.54 | Carbon Tetrachloride | 1.99 | ... |
| Ether . . . | 1.44 | 2.27 | Petroleum Ether . . | 0.023 | 0.028 |

ADIPIO ACID (Normal) $(\text{CH}_2)_4(\text{COOH})_2$.100 grams H_2O dissolve 1.44 grams adipic acid at 15°.(Henry — Compt. rend. 99, 1157, '84; Lamouroux — *Ibid.* 128, 998, '99.)

AIR

SOLUBILITY IN WATER.

(Winkler — Ber. 34, 1409, '01; see also Peterson and Sondern — Ber. 22, 1439, '89.)

| t°. | B. | B'. | cc.* of atmospheric O and N per liter of: Dist. H ₂ O (at 760 mm.). | | Sea Water (at 760 mm.). | |
|-----|---------|---------|---|-----------|-------------------------|-----------|
| | | | Oxygen. | Nitrogen. | Oxygen. | Nitrogen. |
| 0 | 0.02881 | 0.02864 | 10.19 | 18.45 | 7.77 | 14.85 |
| 5 | .02543 | .02521 | 8.91 | 16.30 | 6.93 | 13.32 |
| 10 | .02264 | .02237 | 7.87 | 14.50 | 6.29 | 12.06 |
| 15 | .02045 | .02011 | 7.04 | 13.07 | 5.70 | 11.05 |
| 20 | .01869 | .01826 | 6.35 | 11.91 | ... | 10.25 |
| 25 | .01724 | .01671 | 5.75 | 10.96 | ... | 9.62 |
| 30 | .01606 | .01539 | 5.24 | 10.15 | | |
| 40 | .01418 | .01315 | 4.48 | 8.67 | | |
| 50 | .01297 | .01140 | 3.85 | 7.55 | | |
| 60 | .01216 | .00978 | 3.25 | 6.50 | | |
| 80 | .01126 | .00600 | 1.97 | 4.03 | | |
| 100 | .01105 | .00000 | 0.00 | 0.00 | | |

B = "Coefficient of Absorption," i.e., the amount of gas dissolved by the liquid when the pressure of the gas itself without the tension of the liquid amounts to 760 mm.

B' = "Solubility," i.e., the amount of gas, reduced to 0° and 760 mm., which is absorbed by one volume of the liquid when the barometer indicates 760 mm. pressure.

* Reduced to 0° and 760 mm.

SOLUBILITY OF AIR IN AQUEOUS SULPHURIC ACID AT 18° AND 760 MM.

(Tower — Z. anorg. Ch. 50, 382, '06.)

| Wt. % H ₂ SO ₄ | 98 | 90 | 80 | 70 | 60 | 50 |
|--------------------------------------|--------|--------|--------|--------|--------|--------|
| Solubility Coef. | 0.0173 | 0.0107 | 0.0069 | 0.0055 | 0.0059 | 0.0076 |

SOLUBILITY OF AIR IN ALCOHOL, ETC.

(Robinet — Compt. rend. 58, 608, '64.)

| Solvent. | Vols. Air per 100 Vols. Solvent. | Solvent. | Vols. Air per 100 Vols. Solvent. |
|-----------------|----------------------------------|-------------------|----------------------------------|
| Alcohol (95.1%) | 14.1 | Oil of Lavender. | 6.9 |
| Petroleum | 6.8 | Oil of Turpentine | 24.2 |
| Benzene | 14.0 | | |

ALANINE (α Amido Propionic Acid) CH₃CH(NH₂)COOH.

SOLUBILITY IN MIXTURES OF ALCOHOL AND WATER AT 25°.

(Holleman and Antusch — Rec. trav. chim. 13, 297, '94.)

| Vol. % Alcohol. | Gms. per 100 Gms. Solvent. | Sp. Gr. of Solutions. | Vol. % Alcohol. | Gms. per 100 Gms. Solvent. | Sp. Gr. of Solutions. |
|-----------------|----------------------------|-----------------------|-----------------|----------------------------|-----------------------|
| 0 | 16.47 | 1.0421 | 35 | 4.91 | 0.9670 |
| 5 | 14.37 | 1.0311 | 40 | 3.89 | 0.9577 |
| 10 | 12.43 | 1.0200 | 50 | 2.38 | 0.9355 |
| 15 | 10.49 | 1.0101 | 60 | 1.57 | 0.9102 |
| 20 | 8.48 | 0.9984 | 70 | 0.85 | 0.8836 |
| 25 | 7.11 | 0.9886 | 80 | 0.37 | 0.8556 |
| 31 | 5.53 | 0.9761 | | | |

ALDEHYDE.**SOLUBILITY OF *p* FORMALDEHYDE (TRIOXYMETHYLENE) IN AQUEOUS SODIUM SULPHITE SOLUTIONS AT 20°.**

(Lumière and Seyewetz — Bull. soc. chim. [3] 27, 1213, '02.)

| | | | | |
|--|----|----|----|----|
| Grams Sodium Sulphite per 100 cc. H ₂ O | 5 | 10 | 20 | 28 |
| Gms. Trioxymethylene per 100 cc. solution | 22 | 24 | 26 | 27 |

100 gms. H₂O dissolve 12.5 paraldehyde at 25°, and 6.6 gms. at b. pt.**ALCOHOLS.****SOLUBILITY OF AMYL ALCOHOL IN WATER AT 22°.**

(Herz — Ber. 31, 2671, '98.)

100 cc. water dissolve 3.284 cc. amyl alcohol. Sp. Gr. of solution = 0.9949, Volume = 102.99 cc.

100 cc. amyl alcohol dissolve 2.214 cc. water. Sp. Gr. of solution = 0.8248, Volume = 101.28 cc.

Sp. Gr. of H₂O at 22° = 0.9980; Sp. Gr. of amyl alcohol at 22° = 0.8133.**SOLUBILITY OF AMYL ALCOHOL IN WATER AT DIFFERENT TEMPERATURES, "SYNTHETIC METHOD" (see Note, page 9).**

(Alexejew — Ann. phys. Chem. 28, 305, '86.)

| t°. | Gms. C ₅ H ₁₁ OH per 100 Gms. | | t°. | Gms. C ₅ H ₁₁ OH per 100 Gms. | |
|-----|---|------------------|-----|---|------------------|
| | Aqueous Layer. | Alcoholic Layer. | | Aqueous Layer. | Alcoholic Layer. |
| 0 | 8 | 97 | 100 | 2.0 | 80 |
| 20 | 6 | 94 | 120 | 4.0 | 77 |
| 40 | 4 | 90 | 140 | 7.0 | 73 |
| 60 | 2 | 87 | 150 | 9.0 | 72 |
| 80 | 1.5 | 83 | | | |

SOLUBILITY OF AMYL ALCOHOL IN AQ. ETHYL ALCOHOL SOLUTIONS.

(Bancroft — Phys. Rev. 3, 193, '95-96.)

| cc. Ethyl Alcohol in Mixture. | cc. H ₂ O added to cause Separation of a Second Phase in Mixtures of the given Amounts of Ethyl Alcohol and 3 cc. Portions of Amyl Alcohol at: | |
|-------------------------------|---|--------|
| | 9.1°. | 19.2°. |
| 3 | 13.21 | 3.50 |
| 6 | 10.35 | 10.80 |
| 9 | 18.34 | 19.10 |
| 12 | 27.47 | 29.15 |
| 15 | 41.25 | 43.15 |

NOTE. — The effect of various amounts of a large number of salts upon the temperature (39.8°) at which a mixture of 20 cc. of amyl alcohol + 20 cc. of ethyl alcohol + 32.9 cc. of water becomes homogeneous has been investigated by Pfeiffer (Z. phys. Ch. 9, 444, '92). The results are no doubt of interest from a solubility standpoint, but their recalculation to terms suitable for presentation in the present compilation has not been attempted.

SOLUBILITY OF ISO AMYL ALCOHOL IN WATER.

| t°. | Gms. Iso Amyl Alcohol per 100 Gms. | | Observer. |
|------|------------------------------------|------------------|------------------------------|
| | H ₂ O Layer. | Alcoholic Layer. | |
| 13.7 | 2.0 | ... | Balbrano — Ber. 9, 1437, '76 |
| 16.5 | 2.5 | 92.9 | Wittstein — Jahrb. 408, '62 |
| 22 | 2.61 | 97.36 | Herz — Ber. 31, 2669, '98 |

ALCOHOLS

12

SOLUBILITY OF BUTYL ALCOHOLS IN WATER, "SYNTHETIC METHOD"

(see Note, page 9).
(Alexejew — Ann. phys. Chem. 28, 305, '86.)

| Secondary Butyl Alcohol and Water. | | | Iso Butyl Alcohol and Water. | | |
|---|-------------------|---------------------|-------------------------------------|-------------------|---------------------|
| Gms. Secondary Butyl Alcohol per 100 Gms. | | | Gms. Iso Butyl Alcohol per 100 Gms. | | |
| t°. | Aqueous Layer. | Alcoholic Layer. | t°. | Aqueous Layer. | Alcoholic Layer. |
| -20 | 27 | 66 | ... | ... | ... |
| -10 | 28 | 60 | ... | ... | ... |
| 0 | 27.5 | 56 | 13 | 85 | ... |
| 10 | 26.0 | 57 | ... | ... | ... |
| 20 | 22.5 | 60 | 9 | 84 | ... |
| 30 | 18 | 63.5 | ... | ... | ... |
| 40 | 16 | 65.5 | 7.5 | 83 | ... |
| 60 | 13 | 67 | 7 | 82 | ... |
| 80 | 15 | 63 | 7 | 77.5 | ... |
| 100 | 20 | 52 | 8 | 72 | ... |
| 107 crit. temp. | 33 | ... | ... | ... | ... |
| 120 | ... | ... | 16 | 62 | ... |
| 130 | ... | ... | 28 | 50 | ... |
| 133 crit. temp. | ... | ... | 40 | ... | ... |

DISTRIBUTION OF ETHYL ALCOHOL BETWEEN WATER AND BENZENE

AT 25°.

(Taylor — J. Phys. Ch. 1, 468, '97.)

| Composition of 10 cc. of Upper Layer. | | | Composition of 10 cc. Lower Layer. | | |
|---------------------------------------|-------------------|-----------------------------------|------------------------------------|-------------------|-----------------------------------|
| C ₆ H ₆ . | H ₂ O. | C ₂ H ₅ OH. | C ₆ H ₆ . | H ₂ O. | C ₂ H ₅ OH. |
| 5.92 | 0.60 | 3.48 | 4.37 | 1.07 | 4.56 |
| 6.43 | 0.48 | 3.09 | 3.54 | 1.41 | 5.05 |
| 7.40 | 0.29 | 2.31 | 2.04 | 2.27 | 5.69 |
| 8.13 | 0.17 | 1.70 | 1.08 | 3.22 | 8.70 |
| 8.65 | 0.10 | 1.25 | 0.59 | 4.06 | 5.35 |
| 9.05 | 0.06 | 0.89 | 0.28 | 4.99 | 4.73 |

ALUMINIUM CHLORIDE AlCl₃.

SOLUBILITY IN WATER.

(Gerlach — Z. anal. Ch. 8, 250, '60.)

100 gms. saturated solution contain 41.13 gms. AlCl₃ at 15°, Sp. Gr. of solution = 1.354.

ALUMINIUM SULPHATE Al₂(SO₄)₃.

SOLUBILITY IN WATER.

(Poggiale — Ann. chim. phys. [3] 8, 467, '43.)

| Gms. Al ₂ (SO ₄) ₃ per 100 Gms. | | | Gms. Al ₂ (SO ₄) ₃ per 100 Gms. | | |
|---|--------|-----------|---|--------|-----------|
| t°. | Water. | Solution. | t°. | Water. | Solution. |
| 0 | 31.3 | 23.8 | 60 | 59.1 | 37.2 |
| 10 | 33.5 | 25.1 | 70 | 66.2 | 39.8 |
| 20 | 36.1 | 26.7 | 80 | 73.1 | 42.2 |
| 30 | 40.4 | 28.8 | 90 | 80.8 | 44.7 |
| 40 | 45.7 | 31.4 | 100 | 89.1 | 47.1 |
| 50 | 52.1 | 34.3 | | | |

100 gms. of a saturated solution of aluminium sulphate in glycol contain 14.4 gms. Al₂(SO₄)₃.

(de Coninck — Bull. acad. roy. Belgique, 359, '05.)

ALUMS.

SOLUBILITY OF AMMONIUM ALUM AND OF POTASSIUM ALUM
IN WATER.

(Mulder; Poggiale — Ann. chim. phys. [3] 8, 467, '43; Locke — Am. Ch. J. 26, 174, '01; Marino — Gazz. chim. ital. 35, II, 351, '05; Berkeley — Trans. Roy. Soc. 203 A, 214, '04.)

| t°. | Ammonium Alum. | | | Potassium Alum. | | |
|------|--|---|---|---|--|--|
| | Gms. $(\text{NH}_4)_2\text{Al}_2(\text{SO}_4)_4$ per 100 g. H_2O . | Gms. $(\text{NH}_4)_2\text{Al}_2(\text{SO}_4)_4 \cdot 24\text{H}_2\text{O}$ per 100 g. H_2O . | G. M. $(\text{NH}_4)_2\text{Al}_2(\text{SO}_4)_4$ per 100 g. H_2O . | Gms. $\text{K}_2\text{Al}_2(\text{SO}_4)_4$ per 100 g. H_2O . | Gms. $\text{K}_2\text{Al}_2(\text{SO}_4)_4 \cdot 24\text{H}_2\text{O}$ per 100 g. H_2O . | G. M. $\text{K}_2\text{Al}_2(\text{SO}_4)_4$ per 100 g. H_2O . |
| 0 | 2.10 | 3.90 | 0.0044 | 3.0 | 5.65 | 0.0058 |
| 5 | 3.50 | 6.91 | 0.0074 | 3.5 | 6.62 | 0.0068 |
| 10 | 4.99 | 9.52 | 0.0105 | 4.0 | 7.60 | 0.0077 |
| 15 | 6.25 | 12.66 | 0.0132 | 5.0 | 9.59 | 0.0097 |
| 20 | 7.74 | 15.13 | 0.0163 | 5.9 | 11.40 | 0.0114 |
| 25 | 9.19 | 19.19 | 0.0194 | 7.23 | 14.14 | 0.0140 |
| 30 | 10.94 | 22.01 | 0.0231 | 8.39 | 16.58 | 0.0162 |
| 40 | 14.88 | 30.92 | 0.0314 | 11.70 | 23.83 | 0.0227 |
| 50 | 20.10 | 44.10 | 0.0424 | 17.00 | 36.40 | 0.0329 |
| 60 | 26.70 | 66.65 | 0.0569 | 24.75 | 57.35 | 0.0479 |
| 70 | ... | ... | ... | 40.0 | 110.5 | 0.0774 |
| 80 | ... | ... | ... | 71.0 | 321.3 | 0.1374 |
| 90 | ... | ... | ... | 109.0 | 2275.0 | 0.2110 |
| 92.5 | ... | ... | ... | 119.0 | ∞ | 0.2313 |
| 95 | 109.7 | ∞ | 0.2312 | ... | ... | ... |

NOTE. — The potassium alum figures in the preceding table were taken from a curve plotted from the closely agreeing determinations of Mulder, Locke, Berkeley, and Marino. For the higher temperatures (above 60°), however, the results of Marino are lower than those of the other investigators, and are omitted from the average curve.

Locke called attention in his paper to the fact that Poggiale's results upon ammonium and potassium alum had evidently become interchanged through some mistake. This explanation is entirely substantiated, not only by Locke's determinations, but also by those of Mulder and Berkeley. The ammonium alum figures given above were therefore read from Poggiale's potassium alum curve, with which Locke's determination of the solubility of ammonium alum at 25° is in entire harmony.

SOLUBILITY OF AMMONIUM ALUM IN PRESENCE OF AMMONIUM SULPHATE AND IN PRESENCE OF ALUMINIUM SULPHATE IN WATER.

(Rüchhoff — Ber. 18, 1160, '85.)

| Mixture Used. | 100 Gms. Saturated Solution Contain: | |
|--|---|-------|
| | Grams $(\text{NH}_4)_2\text{SO}_4$ + Grams $\text{Al}_2(\text{SO}_4)_3$. | |
| Saturated Ammonium Alum at 18.5° | 1.42 | 3.69 |
| 20 cc. above sol. + 6 gms. cryst. $\text{Al}_2(\text{SO}_4)_3$ | 0.45 | 16.09 |
| 20 cc. above sol. + 4 gms. cryst. $(\text{NH}_4)_2\text{SO}_4$ | 20.81 | 0.29 |

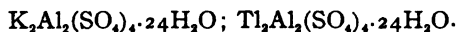
SOLUBILITY OF MIXTURES OF POTASSIUM ALUM AND ALUMINIUM SULPHATE AND OF POTASSIUM ALUM AND POTASSIUM SULPHATE IN WATER.

(Marino — Gazz. chim. ital. 35, II, 351, '05.)

| t°. | Gms. per 1000 Gms. H ₂ O. | | Gm. Mols. per 1000 Mols. H ₂ O. | | Solid Phase. |
|-----|--|----------------------------------|--|----------------------------------|--|
| | Al ₂ (SO ₄) ₃ ·18H ₂ O. | K ₂ SO ₄ . | Al ₂ (SO ₄) ₃ ·18H ₂ O. | K ₂ SO ₄ . | |
| 0 | 243.73 | 23.45 | 6.1 | 2.3 | K ₂ Al ₂ (SO ₄) ₂ ·24H ₂ O |
| 20 | 824.25 | 30.85 | 15.1 | 3.1 | + Al ₂ (SO ₄) ₃ |
| 35 | 911.02 | 35.29 | 24.1 | 3.6 | " |
| 50 | 1243.21 | 59.55 | 33.5 | 6.1 | " |
| 65 | 1598.00 | 119.43 | 43.1 | 12.6 | " |
| 77 | 1872.11 | 183.80 | 50.5 | 18.9 | " |
| 0 | 5.06 | 75.83 | 0.1 | 7.8 | K ₂ Al ₂ (SO ₄) ₂ ·24H ₂ O |
| 0.5 | 8.66 | 75.18 | 0.2 | 7.7 | + K ₂ SO ₄ |
| 5. | 16.07 | 85.78 | 0.4 | 8.8 | " |
| 10 | 18.52 | 96.50 | 0.5 | 9.9 | " |
| 15 | 20.56 | 109.30 | 0.55 | 11.2 | " |
| 30 | 39.60 | 147.8 | 1.0 | 15.2 | " |
| 40 | 73.88 | 163.1 | 1.9 | 16.8 | " |
| 50 | 126.0 | 195.4 | 3.4 | 20.1 | " |
| 60 | 249.7 | 238.8 | 6.7 | 24.6 | " |
| 70 | 529.0 | 323.7 | 14.2 | 32.6 | " |
| 80 | 1044.0 | 517.27 | 28.1 | 53.4 | " |

SOLUBILITY OF MIXTURES OF POTASSIUM ALUM AND OF THALLIUM ALUM IN WATER AT 25°.

(Fock — Z. Kryst. Min. 28, 397, '97.)



| Composition of Solution. | | | | | Sp. Gr. of Solutions. | Solid Phase Mol. % of Potassium Alum. |
|---|-----------|--|-----------|---|-----------------------|---------------------------------------|
| KAl(SO ₄) ₂ per Liter. | | TlAl(SO ₄) ₂ per Liter. | | Mol. % KAl(SO ₄) ₂ . | | |
| Grams. | Mg. Mols. | Grams. | Mg. Mols. | | | |
| 69.90 | 270.5 | 0.00 | 0.00 | 100 | 1.0591 | 100.0 |
| 74.56 | 288.2 | 0.48 | 1.13 | 99.61 | 1.0601 | 99.32 |
| 67.90 | 262.8 | 1.72 | 4.07 | 98.48 | 1.0598 | 96.84 |
| 65.30 | 252.7 | 4.52 | 10.67 | 95.95 | 1.0603 | 90.84 |
| 64.95 | 251.4 | 9.60 | 22.67 | 91.73 | 1.0605 | 82.94 |
| 53.23 | 205.9 | 18.44 | 43.56 | 82.54 | 1.0609 | 68.24 |
| 45.32 | 175.4 | 24.60 | 58.10 | 75.12 | 1.0609 | 58.23 |
| 38.02 | 147.2 | 32.48 | 76.75 | 65.73 | 1.0611 | 46.72 |
| 34.54 | 133.6 | 35.59 | 84.10 | 61.36 | 1.0611 | 44.23 |
| 28.35 | 109.7 | 42.99 | 101.60 | 51.93 | 1.0623 | 32.07 |
| 10.94 | 42.4 | 66.12 | 156.2 | 21.34 | 1.0654 | 7.94 |
| 0.00 | 0.0 | 75.46 | 178.3 | 0.00 | 1.0674 | 0.00 |

SOLUBILITY OF SODIUM ALUM IN WATER.

100 gms. H_2O dissolve 51.0 gms. (?anhy.) $\text{Al}_2\text{Na}_2(\text{SO}_4)_4 \cdot 24\text{H}_2\text{O}$ at 16° .
(Auge — Compt. rend. 110, 1139, '90.)

100 gms. H_2O dissolve 110.0 gms. $\text{Al}_2\text{Na}_2(\text{SO}_4)_4 \cdot 24\text{H}_2\text{O}$ at 0° .
(Tilden — J. Ch. Soc. (Lond.) 45, 260, '84.)

SOLUBILITY OF CAESIUM ALUM, RUBIDIUM ALUM, AND OF THALLIUM ALUM IN WATER.

(Setterburg — Liebig's Annalen, 211, 104, '82; Locke — Am. Ch. J. 26, 183, '01; Berkeley — Trans. Roy. Soc. 203 A, 215, '04.)

| t°. | Caesium Alum. | | Rubidium Alum. | | Thallium Alum. | |
|-----|--|--|--|--|--|--|
| | Gms. per 100 Gms. H_2O . | | Gms. per 100 Gms. H_2O . | | Gms. per 100 Gms. H_2O . | |
| | $\text{Al}_2\text{Cs}_2(\text{SO}_4)_4$ | $\text{Al}_2\text{Cs}_2(\text{SO}_4)_4 \cdot 24\text{H}_2\text{O}$ | $\text{Al}_2\text{Rb}_2(\text{SO}_4)_4$ | $\text{Al}_2\text{Rb}_2(\text{SO}_4)_4 \cdot 24\text{H}_2\text{O}$ | $\text{Al}_2\text{Tl}_2(\text{SO}_4)_4$ | $\text{Al}_2\text{Tl}_2(\text{SO}_4)_4 \cdot 24\text{H}_2\text{O}$ |
| 0 | 0.21 | 0.34 | 0.72 | 1.21 | 3.15 | 4.84 |
| 5 | 0.25 | 0.40 | 0.86 | 1.48 | 3.80 | 5.86 |
| 10 | 0.30 | 0.49 | 1.05 | 1.81 | 4.60 | 7.12 |
| 20 | 0.40 | 0.65 | 1.50 | 2.59 | 6.40 | 10.00 |
| 25 | 0.50 | 0.81 | 1.80 | 3.12 | 7.60 | 11.95 |
| 30 | 0.60 | 0.97 | 2.20 | 3.82 | 9.38 | 14.89 |
| 40 | 0.85 | 1.38 | 3.25 | 5.69 | 14.40 | 23.57 |
| 50 | 1.30 | 2.11 | 4.80 | 8.50 | 22.50 | 38.41 |
| 60 | 2.00 | 3.27 | 7.40 | 13.36 | 35.36 | 65.19 |
| 70 | 3.20 | 5.27 | 12.40 | 23.25 | ... | ... |
| 80 | 5.40 | 9.01 | 21.60 | 43.25 | ... | ... |
| 90 | 10.50 | 18.11 | ... | ... | ... | ... |
| 100 | 22.70 | 42.54 | ... | ... | ... | ... |

NOTE. — Curves were plotted from the closely agreeing determinations recorded by the above named investigators and the table constructed from the curves.

AMINES.

METHYL AMINE AND TRI METHYL AMINE, DISTRIBUTION BETWEEN:

Water and Amyl Alcohol.

(Herz and Fischer — Ber. 37, 4751, '04.)

| Gms. $\text{NH}_2(\text{CH}_3)$ per 100 cc. | | Millimols $\text{NH}_2(\text{CH}_3)$ per 10 cc. | |
|--|------------------|--|------------------|
| Aq. Layer. | Alcoholic Layer. | Aq. Layer. | Alcoholic Layer. |
| 0.37 | 0.12 | 1.155 | 0.3804 |
| 0.94 | 0.33 | 3.036 | 1.070 |
| 1.57 | 0.54 | 5.054 | 1.759 |
| 1.89 | 0.69 | 6.083 | 2.219 |
| 2.00 | 0.72 | 6.429 | 2.315 |
| 2.53 | 0.92 | 8.126 | 2.981 |
| 3.30 | 1.24 | 10.613 | 3.974 |

Water and Benzene.

(Herz and Fischer — Ber. 38, 1143, '05.)

| Gms. $\text{N}(\text{CH}_3)_3$ per 100 cc. | | Millimols $\text{N}(\text{CH}_3)_3$ per 10 cc. | |
|---|-------------------------------|---|-------------------------------|
| Aq. Layer. | C_6H_6 Layer. | Aq. Layer. | C_6H_6 Layer. |
| 0.345 | 0.174 | 0.584 | 0.295 |
| 0.812 | 0.396 | 1.377 | 0.670 |
| 1.075 | 0.545 | 1.819 | 0.921 |
| 1.462 | 0.731 | 2.474 | 1.237 |
| 2.139 | 1.077 | 3.619 | 1.823 |
| 2.757 | 1.376 | 4.663 | 2.328 |
| 3.292 | 1.683 | 5.568 | 2.847 |
| 3.996 | 2.053 | 6.760 | 3.474 |
| 6.582 | 3.465 | 11.135 | 5.861 |

SOLUBILITIES OF DI ETHYL AMINE AND WATER.*

(Lattey — Phil. Mag. [6] 10, 398, '05.)

| t°. | Gms. $\text{NH}(\text{C}_2\text{H}_5)_2$ per 100 Gms. | |
|------------------|---|--------------|
| | Aqueous Layer. | Amine Layer. |
| 155 | 21.7 | 59.0 |
| 150 | 23.6 | 55.5 |
| 148 | 24.8 | 53.5 |
| 146 | 26.3 | 51.0 |
| 145 | 28.0 | 49.0 |
| 144 | 31.0 | 45.0 |
| 143.5 (crit. t.) | 37.4 | |

DISTRIBUTION OF TRI ETHYL AMINE BETWEEN WATER AND AMYL ALCOHOL AT 25°.

(Herz and Fischer — Ber. 37, 4751, '04.)

| Gms. $\text{N}(\text{C}_2\text{H}_5)_3$ per 100 cc. | | Millimols $\text{N}(\text{C}_2\text{H}_5)_3$ per 10 cc. | |
|---|------------------|---|------------------|
| Aqueous Layer. | Alcoholic Layer. | Aqueous Layer. | Alcoholic Layer. |
| 0.0885 | 2.299 | 0.0875 | 2.273 |
| 0.1683 | 4.457 | 0.1664 | 4.408 |
| 0.1866 | 4.922 | 0.1846 | 4.868 |
| 0.2502 | 6.491 | 0.2474 | 6.418 |

Tri Ethyl AMINE $\text{N}(\text{C}_2\text{H}_5)_3$.

SOLUBILITY IN WATER.

(Rothmund — Z. phys. Ch. 26, 433, '98.)

| t°. | Gms. $\text{N}(\text{C}_2\text{H}_5)_3$ per 100 Gms. | | t°. | Gms. $\text{N}(\text{C}_2\text{H}_5)_3$ per 100 Gms. | |
|--------------------|--|--------------|-----|--|--------------|
| | Aq. Layer. | Amine Layer. | | Aq. Layer. | Amine Layer. |
| 18.6 (crit. temp.) | | 51.9 | 40 | 3.65 | 96.48 |
| 20 | 14.24 | 72.0 | 50 | 2.87 | 96.4 |
| 25 | 7.30 | 95.18 | 55 | 2.57 | 96.3 |
| 30 | 5.80 | 96.60 | 60 | 2.23 | 96.3 |
| 35 | 4.58 | 96.5 | 65 | 1.97 | 96.3 |

SOLUBILITY OF TRI ETHYL AMINE IN MIXTURES OF WATER AND ETHYL ALCOHOL AT DIFFERENT TEMPERATURES.*

(Meerburg — Z. phys. Ch. 40, 647, '02.)

| 0% Alcohol. | | 13.31% Alcohol. | | 28.93% Alcohol. | | 38.84% Alcohol. | | 60.16% Alcohol | |
|-------------|---|-----------------|---|-----------------|---|-----------------|---|----------------|---|
| t°. | G. $\text{N}(\text{C}_2\text{H}_5)_3$ per 100 g. sol. | t°. | G. $\text{N}(\text{C}_2\text{H}_5)_3$ per 100 g. sol. | t°. | G. $\text{N}(\text{C}_2\text{H}_5)_3$ per 100 g. sol. | t°. | G. $\text{N}(\text{C}_2\text{H}_5)_3$ per 100 g. sol. | t°. | G. $\text{N}(\text{C}_2\text{H}_5)_3$ per 100 g. sol. |
| 69.2 | 1.7 | 38.3 | 8.2 | 54.5 | 22.8 | 73.4 | 31.2 | 76-77 | 71.2 |
| 30.8 | 5.6 | 31.7 | 13.9 | 45.0 | 29.8 | 65.4 | 33.3 | 74-75 | 75.0 |
| 23.1 | 8.5 | 28.0 | 21.6 | 33.4 | 51.1 | 51.6 | 40.6 | 72-73 | 80.0 |
| 18.7 | 25.8 | 26.4 | 30.6 | 31.4 | 63.7 | 42.1 | 50.6 | | |
| 18.7 | 37.2 | 24.9 | 40.5 | 30.3 | 68.5 | 40.9 | 54.7 | | |
| 19.5 | 51.8 | 24.2 | 49.8 | 28.5 | 82.2 | 34.2 | 70.6 | | |
| 20.5 | 68.6 | 24.1 | 60.7 | 35.0 | 91.8 | 33.0 | 77.5 | | |
| 20.5 | 84.0 | 24.0 | 69.7 | | | 34.7 | 88.0 | | |
| 20.5 | 89.7 | 23.5 | 73.6 | | | 40.5 | 91.3 | | |
| 21.4 | 92.4 | 24.0 | 81.5 | | | | | | |
| 25.8 | 95.5 | 24.2 | 87.4 | | | | | | |
| 26.5 | 96.1 | 25.0 | 92.0 | | | | | | |

NOTE. — Results for Tri Ethyl Amine, Water and Ethyl Ether, and for Tri Ethyl Amine, Water and Phenol are also given by Meerburg.

100 gms. abs. methyl alcohol dissolve 57.5 grams $\text{NH}(\text{C}_2\text{H}_5)_2$, at 19.5°.
100 gms. abs. ethyl alcohol dissolve 56.0 grams $\text{NH}(\text{C}_2\text{H}_5)_2$, at 19.5°.

(de Bruyn — Z. phys. Ch. 10, 784, 1892.)

* Determinations made by "Synthetic Method," see Note, page 9.

SOLUBILITY OF DI PHENYL AMINE AND ALSO OF TRI PHENYL AMINE IN CARBON BISULPHIDE.

(Arctowski — Compt. rend. 121, 123, '95.)

| NH(C ₆ H ₅) ₂ in CS ₂ . | | N(C ₆ H ₅) ₃ in CS ₂ . | |
|--|-----------------------------|---|-----------------------------|
| t°. | Gms. per 100 Gms. Solution. | t°. | Gms. per 100 Gms. Solution. |
| -88½ | 0.87 | -83 | 1.91 |
| -117 | 0.37 | -91 | 1.56 |
| | | -102 | 1.24 |
| | | -113½ | 0.98 |

SOLUBILITY OF DI PHENYL AMINE IN HEXANE AND IN CARBON BISULPHIDE.

(Etard — Ann. chim. phys. [7] 2, 570, '94.)

| t°. | Gms. NH(C ₆ H ₅) ₂ per 100 Gms. Sol. in : | | t°. | Gms. NH(C ₆ H ₅) ₂ per 100 Gms. Sol. in : | |
|-----|---|-------------------|-----|---|-------------------|
| | Hexane. | CS ₂ . | | Hexane. | CS ₂ . |
| -60 | ... | 1.3 | 0 | 2.6 | 33.7 |
| -50 | ... | 2.2 | +10 | 3.8 | 46.8 |
| -40 | ... | 3.8 | 20 | 6.7 | 60.9 |
| -30 | 0.5 | 7.2 | 30 | 13.8 | 76.0 |
| -20 | 0.8 | 12.5 | 40 | 47.0 | ... |
| -10 | 1.4 | 21.6 | 50 | 94.0 | ... |

AMMONIA NH₃.

SOLUBILITY OF AMMONIA IN WATER.

(Roscoe and Dittmar — Liebig's Annalen, 112, 334, '59; Raoult — Ann. chim. [5] 1, 262, '74; Mallet — Am. Ch. J. 19, 807, '97.)

| t°. | At 760 mm. Pressure. | | t°. | At 760 mm. Pressure. | |
|-----|---|---|-----|---|---|
| | G. NH ₃ per 100 g. H ₂ O. | Vol. NH ₃ per 1 g. H ₂ O. | | G. NH ₃ per 100 g. H ₂ O. | Vol. NH ₃ per 1 g. H ₂ O. |
| -40 | 294.6 | ... | 20 | 52.6 | 710 |
| -30 | 278.1 | ... | 25 | 46.0 | 635 |
| -20 | 176.8 | ... | 30 | 40.3 | 595 (28°) |
| -10 | 111.5 | ... | 35 | 35.5 | ... |
| 0 | 87.5 | 1299 | 40 | 30.7 | ... |
| 5 | 77.5 | 1019 | 45 | 27.0 | ... |
| 10 | 67.9 | 910 | 50 | 22.9 | ... |
| 15 | 60.0 | 802 | 56 | 18.5 | ... |

SOLUBILITY OF AMMONIA IN AQUEOUS SALT SOLUTIONS.

(Raoult.)

| t°. | In Calcium Nitrate Solutions | | In Potassium Hydroxide Solutions | |
|-----|---|---|---|---|
| | Gms. NH ₃ per 100 Gms. Solvent in: | Gms. NH ₃ per 100 Gms. Solvent in: | Gms. NH ₃ per 100 Gms. Solvent in: | Gms. NH ₃ per 100 Gms. Solvent in: |
| | 28.38% Ca(NO ₃) ₂ . | In 59.03% Ca(NO ₃) ₂ . | 11.25% KOH. | 25.25% KOH. |
| 0 | 96.25 | 104.5 | 72.0 | 49.5 |
| 8 | 78.50 | 84.75 | 57.0 | 37.5 |
| 16 | 65.00 | 70.5 | 46.0 | 28.5 |
| 24 | ... | ... | 37.3 | 21.8 |

MUTUAL SOLUBILITY OF AQUEOUS AMMONIA AND POTASSIUM CARBONATE SOLUTIONS.

(Newth — J. Chem. Soc. 77, 776, 1900.)

The solutions used were: Potassium Carbonate saturated at 15° (contained 57.2 grams K_2CO_3 per 100 cc.). Aqueous Ammonia of 0.885 Sp. Gr. (contained about 33 per cent ammonia). The determinations were made by adding successive small quantities of one of the solutions to a measured volume of the other, and observing the point at which opalescence appeared.

| t°. | Saturated K_2CO_3 in Aq. Ammonia. | | Aq. Ammonia in Saturated K_2CO_3 . | |
|-----|-------------------------------------|----------------------------------|--------------------------------------|----------------------------------|
| | cc. K_2CO_3 per 100 cc. Ammonia. | % K_2CO_3 Solution in Mixture. | cc. Ammonia in 100 cc. K_2CO_3 . | % K_2CO_3 Solution in Mixture. |
| I | 2.0 | 2.0 | 37.5 | 72.7 |
| 6 | 3.0 | 3.0 | 47.5 | 67.6 |
| 11 | 5.0 | 4.7 | 52.5 | 65.0 |
| 16 | 6.5 | 6.1 | 60.0 | 63.0 |
| 21 | 8.5 | 8.0 | 77.5 | 56.3 |
| 26 | 10.5 | 9.5 | 105.0 | 49.0 |
| 31 | 12.5 | 11.1 | 152.5 | 39.0 |
| 38 | 20.0 | 16.6 | 195.0 | 33.0 |
| 39 | 21.0 | 17.0 | 220.0 | 31.0 |
| 42 | 25.0 | 20.0 | 250.0 | 28.5 |
| 43 | 35.0 | 26.0 | 285.0 | 26.5 |

Above 43° the solutions are completely miscible. If 10 per cent of water is added to each solution the temperature of complete miscibility is lowered to 25°. The mutual solubilities are:

| t°. | Per cent K_2CO_3 Solution in: | |
|----------------|---------------------------------|-----------------------|
| | Ammonia Layer. | K_2CO_3 Sol. Layer. |
| 0 | 8 | 62 |
| 10 | 11 | 52 |
| 20 | 15 | 38 |
| 25 (crit. pt.) | | 25 |

With the addition of 12.9 per cent of water to each solution the temperature of complete miscibility (crit. pt.) is lowered to 10°. With the addition of 18.1 per cent water this temperature becomes 0°.

SOLUBILITY OF AMMONIA IN ABSOLUTE ETHYL ALCOHOL.

(Delepine — J. pharm. chim. [5] 25, 496, 1892; de Bruyn — Rec. trav. chim. 11, 112, '92.)

| t°. | Density. | Gms. NH_3 per 100 cc. Solution. | Gms. NH_3 per 100 Gms. Solution. | | Gms. NH_3 per 100 Gms. Alcohol | |
|-----|----------|-----------------------------------|------------------------------------|-------------|----------------------------------|-------------|
| | | | (Delepine.) | (de Bruyn.) | (Delepine.) | (de Bruyn.) |
| 0 | 0.782 | 13.05 | 20.95 | 19.7 | 26.5 | 24.5 |
| 5 | 0.784 | 12.00 | 19.00 | 17.5 | 23.0 | 21.2 |
| 10 | 0.787 | 10.85 | 16.43 | 15.0 | 19.6 | 17.8 |
| 15 | 0.789 | 9.20 | 13.00 | 13.2 | 15.0 | 15.2 |
| 20 | 0.791 | 7.50 | 10.66 | 11.5 | 11.9 | 13.2 |
| 25 | 0.794 | 6.00 | 10.0 | 10.0 | 11.0 | 11.2 |
| 30 | 0.798 | 5.15 | 9.7 | 8.8 | 10.7 | 9.5 |

SOLUBILITY OF AMMONIA IN AQUEOUS ETHYL ALCOHOL.

(Delepine.)

| t°. | In 96% Alcohol. | | In 90% Alcohol. | | In 80% Alcohol. | |
|-----|-------------------|--------------------------------------|-------------------|--------------------------------------|-------------------|--------------------------------------|
| | Sp. Gr. Solution. | G. NH ₃ per 100 Gms. Sol. | Sp. Gr. Solution. | G. NH ₃ per 100 Gms. Sol. | Sp. Gr. Solution. | G. NH ₃ per 100 Gms. Sol. |
| 0 | 0.783 | 24.5 | 0.800 | 30.25 | 0.808 | 39.0 |
| 10 | 0.803 | 18.6 | 0.794 | 28.8 | 0.800 | 28.8 |
| 20 | 0.788 | 14.8 | 0.795 | 15.8 | 0.821 | 19.1 |
| 30 | 0.791 | 10.7 | 0.796 | 11.4 | 0.826 | 12.2 |

| t°. | In 60% Alcohol. | | In 50% Alcohol. | |
|-----|-------------------|--------------------------------------|-------------------|--------------------------------------|
| | Sp. Gr. Solution. | G. NH ₃ per 100 Gms. Sol. | Sp. Gr. Solution. | G. NH ₃ per 100 Gms. Sol. |
| 0 | 0.830 | 50.45 | 0.835 | 69.77 |
| 10 | 0.831 | 37.3 | 0.850 | 43.86 |
| 20 | 0.842 | 26.1 | 0.869 | 33.8 |
| 30 | 0.846 | 21.2 | 0.883 | 25.2 |

SOLUBILITY OF AMMONIA IN ABSOLUTE METHYL ALCOHOL.

(de Bruyn — Rec. trav. chim. 11, 112, '92.)

| t°. | G. NH ₃ per 100 Grams. | | t°. | G. NH ₃ per 100 Grams. | |
|-----|-----------------------------------|----------|-----|-----------------------------------|----------|
| | Solution. | Alcohol. | | Solution. | Alcohol. |
| 0 | 29.3 | 41.5 | 20 | 19.2 | 23.8 |
| 5 | 26.5 | 36.4 | 25 | 16.5 | 20.0 |
| 10 | 24.2 | 31.8 | 30 | 14.0 | 16.0 |
| 15 | 21.6 | 27.8 | | | |

DISTRIBUTION OF AMMONIA BETWEEN:

Water and Amyl Alcohol at 20°.

(Herz and Fischer — Ber. 37, 4747, '04.)

Water and Chloroform at 20°.

(Dawson and McCrae — J. Ch. Soc. 79, 406, '01; see also Hantsch and Sebaldt — Z. phys. Ch. 30, 258, '99.)

| Gms. NH ₃ per 100 cc. | | G. M. NH ₃ per 100 cc. | | Gms. NH ₃ per 100 cc. | | G. M. NH ₃ per 100 cc. | |
|----------------------------------|------------------|-----------------------------------|------------------|----------------------------------|--------------------------|-----------------------------------|--------------------------|
| Aq. Layer. | Alcoholic Layer. | Aq. Layer. | Alcoholic Layer. | Aq. Layer. | CHCl ₃ Layer. | Aq. Layer. | CHCl ₃ Layer. |
| 0.5 | 0.072 | 0.25 | 0.0035 | 0.2 | 0.007 | 0.01 | 0.00038 |
| 1.0 | 0.147 | 0.50 | 0.0073 | 0.4 | 0.015 | 0.02 | 0.00073 |
| 2.0 | 0.272 | 1.00 | 0.0148 | 0.6 | 0.023 | 0.03 | 0.00114 |
| 3.0 | 0.438 | 2.00 | 0.0295 | 0.8 | 0.031 | 0.04 | 0.00152 |
| 4.0 | 0.595 | 3.00 | 0.0460 | 1.0 | 0.039 | 0.05 | 0.00193 |
| 5.0 | 0.756 | | | 1.2 | 0.046 | 0.06 | 0.00232 |
| | | | | 1.4 | 0.055 | 0.08 | 0.00311 |
| | | | | 1.6 | 0.063 | 0.10 | 0.00396 |

NOTE. — The influence of a large number of electrolytes upon the distribution of ammonia between water and chloroform was also investigated. For calculations of above distribution results, see Note, page 4.

AMMONIUM ARSENATES

20

SOLUBILITY OF AMMONIUM CALCIUM ARSENATE AND AMMONIUM MAGNESIUM ARSENATE IN WATER, ETC.

(Field — J. Ch. Soc. 11, 6, '73.)

| Solvent. | Grams per 100 Grams Solvent. | |
|--|---|---|
| | $\text{NH}_4\text{CaAsO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$ | $\text{NH}_4\text{MgAsO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$ |
| Water | 0.02 | 0.014 |
| Aq. Ammonia 10% (Sp. Gr. 0.88) | 0.001 | 0.007 |
| Aq. NH_4Cl 5% | 0.415 | ... |
| Aq. NH_4Cl 10% | ... | 0.095 |

AMMONIUM BENZOATE $\text{NH}_4\text{C}_7\text{H}_5\text{O}_2$.

SOLUBILITY IN WATER AND IN ALCOHOL.

| t°. | Gms. $\text{NH}_4\text{C}_7\text{H}_5\text{O}_2$ per 100 Gms. Solvent in: | |
|--------|---|----------|
| | Water. | Alcohol. |
| 25 | 9.52 | 4.0 |
| b. pt. | 83.33 | 13.2 |

AMMONIUM BROMO PLATINATE $(\text{NH}_4)_2\text{PtBr}_6$.

100 gms. sat. aq. solution contain 0.59 gm. $(\text{NH}_4)_2\text{PtBr}_6$ at 20°.

(Halberstadt — Ber. 17, 2965, '84.)

AMMONIUM BROMIDE NH_4Br .

SOLUBILITY IN WATER.

(Eder — Abb. K. Akad. Wiss. (Berlin) 82 ii, 1284, '80.)

| t°. | Gms. NH_4Br per 100 Grams. | | t°. | Gms. NH_4Br per 100 Grams. | |
|-----|--|--------|-----|--|--------|
| | Solution. | Water. | | Solution. | Water. |
| 10 | 39.8 | 66.2 | 50 | 48.5 | 94.3 |
| 20 | 42.5 | 74.0 | 60 | 50.2 | 101.0 |
| 30 | 44.8 | 81.3 | 80 | 53.5 | 115.0 |
| 40 | 46.7 | 87.5 | 100 | 56.1 | 128.2 |

SOLUBILITY OF AMMONIUM BROMIDE IN ABSOLUTE ETHYL ALCOHOL, METHYL ALCOHOL, AND IN ETHER.

(Eder; de Bruyn — Z. phys. Ch. 10, 783, '92.)

| t°. | In Ethyl Alcohol. Gms. NH_4Br per 100 Grams. | | t°. | In Methyl Alcohol. Gms. NH_4Br per 100 Grams. | | In Ether (0.720 Sp. Gr.). Gms. NH_4Br per 100 Grams. |
|-----|--|----------|------|---|----------|--|
| | Solution. | Alcohol. | | Solution. | Alcohol. | Ether. |
| 15 | 2.97 | 3.06 | ... | ... | ... | 0.123 |
| 19 | 3.12 | 3.22 | 11.1 | 12.5 | ... | ... |
| 78 | 9.50 | 10.50 | ... | ... | ... | ... |

Solubility of Tetra Ethyl AMMONIUM BROMIDE $\text{N}(\text{C}_2\text{H}_5)_4\text{Br}$, and of Tetra Methyl Ammonium Bromide $\text{N}(\text{CH}_3)_4\text{Br}$ in Acetonitril.

(Walden — Z. phys. Ch. 55, 712, '06.)

100 cc. sat. solution in CH_3CN contain 9.59 gms. $\text{N}(\text{C}_2\text{H}_5)_4\text{Br}$ at 25°.

100 cc. sat. solution in CH_3CN contain 0.17 gm. $\text{N}(\text{CH}_3)_4\text{Br}$ at 25°.

AMMONIUM CADMIUM BROMIDE $\text{NH}_4\text{Br} \cdot \text{CdBr}_2 \cdot \frac{1}{2}\text{H}_2\text{O}$.

100 parts of water dissolve 137.0 parts $\text{NH}_4\text{Br} \cdot \text{CdBr}_2 \cdot \frac{1}{2}\text{H}_2\text{O}$.

100 parts of alcohol dissolve 18.8 parts $\text{NH}_4\text{Br} \cdot \text{CdBr}_2 \cdot \frac{1}{2}\text{H}_2\text{O}$.

100 parts of ether dissolve 0.36 part $\text{NH}_4\text{Br} \cdot \text{CdBr}_2 \cdot \frac{1}{2}\text{H}_2\text{O}$.

(Eder — Dingler polyt. J. 221, 89, '76.)

AMMONIUM CARBONATE $(\text{NH}_4)_2\text{CO}_3$.

100 grams H_2O dissolve 100 grams $(\text{NH}_4)_2\text{CO}_3 \cdot \text{H}_2\text{O}$ at 15° .
 100 grams glycerine dissolve 20 grams $(\text{NH}_4)_2\text{CO}_3$ at 15° .

(Divers — J. Ch. Soc. 23, 171, '70.)

AMMONIUM BICARBONATE NH_4HCO_3 .

SOLUBILITY IN WATER.

(Dibbitts — J. pr. Ch. [2] 10, 417, '74.)

| t°. | Gms. NH_4HCO_3 per 100 Grams. | | t°. | Grams NH_4HCO_3 per 100 Grams. | |
|-----|---|--------|-----|--|--------|
| | Solution. | Water. | | Solution. | Water. |
| 0 | 10.6 | 11.9 | 20 | 17.4 | 21.0 |
| 5 | 12.1 | 13.7 | 25 | 19.3 | 23.9 |
| 10 | 13.7 | 15.8 | 30 | 21.3 | 27.0 |
| 15 | 15.5 | 18.3 | | | |

SOLUBILITY OF AMMONIUM BICARBONATE IN AQUEOUS SOLUTIONS OF AMMONIUM CHLORIDE SATURATED WITH CO_2 .

(Fedotieff — Z. phys. Ch. 49, 168, '04.)

| t°. | Wt. of 1 cc. Sol. | Per 1000 cc. Solution. | | | | Per 1000 Grams H_2O . | | | |
|-----|----------------------|-----------------------------------|--------------------------------------|----------------------------------|-------------------------------------|---------------------------------------|--------------------------------------|----------------------------------|-------------------------------------|
| | | G. M. NH_4Cl . | G. M. NH_4HCO_3 . | Gms. NH_4Cl . | Gms. NH_4HCO_3 . | G. M. NH_4Cl . | G. M. NH_4HCO_3 . | Gms. NH_4Cl . | Gms. NH_4HCO_3 . |
| 0 | ... | ... | ... | ... | ... | 0.0 | 1.22 | 0.0 | 119.0 |
| 0 | 1.077 | 4.41 | 0.37 | 235.9 | 29.2 | 5.42 | 0.46 | 290.8 | 36.0 |
| 15 | 1.064 | 0.0 | 2.12 | 0.0 | 167.2 | 0.0 | 2.36 | 0.0 | 186.4 |
| 15 | 1.063 | 0.5 | 1.84 | 26.8 | 145.2 | 0.56 | 2.06 | 29.9 | 162.9 |
| 15 | 1.062 | 1.0 | 1.59 | 53.5 | 125.5 | 1.13 | 1.80 | 60.6 | 142.2 |
| 15 | 1.062 | 1.41 | 1.42 | 75.4 | 112.2 | 1.59 | 1.60 | 85.1 | 126.9 |
| 15 | 1.065 | 1.89 | 4.28 | 100.8 | 101.1 | 2.18 | 1.48 | 116.8 | 116.8 |
| 15 | 1.069 | 2.87 | 0.99 | 153.3 | 78.2 | 3.42 | 1.18 | 183.0 | 93.3 |
| 15 | 1.076 | 3.84 | 0.79 | 205.2 | 62.5 | 5.03 | 0.98 | 269.3 | 77.3 |
| 15 | 1.085 | 4.82 | 0.65 | 257.9 | 51.4 | 6.21 | 0.84 | 332.5 | 66.4 |
| 15 | 1.085 | 4.95 | 0.62 | 264.8 | 48.9 | 6.40 | 0.81 | 343.5 | 64.2 |
| 30 | ... | ... | ... | ... | ... | 0.0 | 3.42 | 0.0 | 270.0 |
| 30 | ... | ... | ... | ... | ... | 7.4 | 1.15 | 397.0 | 91.0 |

SOLUBILITY OF AMMONIUM BICARBONATE IN AQUEOUS SOLUTIONS OF SODIUM BICARBONATE SATURATED WITH CO_2 .

(Fedotieff.)

| t°. | Wt. of 1 cc. Sol. | Per 1000 cc. Solution. | | | | Per 1000 Grams H_2O . | | | |
|-----|----------------------|-----------------------------|--------------------------------------|----------------------------|-------------------------------------|---------------------------------------|--------------------------------------|----------------------------|-------------------------------------|
| | | G. M. NaHCO_3 . | G. M. NH_4HCO_3 . | Gms. NaHCO_3 . | Gms. NH_4HCO_3 . | G. M. NaHCO_3 . | G. M. NH_4HCO_3 . | Gms. NaHCO_3 . | Gms. NH_4HCO_3 . |
| 0 | ... | ... | ... | ... | ... | 0.0 | 1.51 | 0.0 | 119.0 |
| 0 | 1.072 | 0.53 | 1.28 | 44.6 | 101.4 | 0.58 | 1.39 | 48.2 | 109.4 |
| 15 | 1.064 | 0.0 | 2.12 | 0.0 | 167.2 | 0.0 | 2.36 | 0.0 | 186.4 |
| 15 | 1.090 | 0.63 | 1.92 | 52.5 | 151.3 | 0.71 | 2.16 | 59.2 | 170.6 |
| 30 | ... | ... | ... | ... | ... | 0.0 | 3.42 | 0.0 | 270.0 |
| 30 | ... | ... | ... | ... | ... | 0.83 | 2.91 | 70.0 | 230.0 |

AMMONIUM BICARBONATE 22

SOLUBILITY OF MIXTURES OF AMMONIUM BICARBONATE, SODIUM BICARBONATE, AND AMMONIUM CHLORIDE IN WATER SATURATED WITH CO₂.

(Fedotieff.)

| t°. | Wt. of 1 cc. Sol. | Gram Mols. per 1000 Gms. H ₂ O. | | | Gms. per 1000 Gms. H ₂ O. | | | Solid Phase. |
|-----|----------------------|---|-------|---------------------|--------------------------------------|-------|---------------------|-----------------|
| | | NaHCO ₃ . | NaCl. | NH ₄ Cl. | NaHCO ₃ . | NaCl. | NH ₄ Cl. | |
| 0 | 1.114 | 0.59 | 0.96 | 4.92 | 49.61 | 56.16 | 263.4 | a + b + c |
| 0 | 1.187 | 0.12 | 4.83 | 2.74 | 10.09 | 282.6 | 146.7 | " |
| 15 | 1.116 | 0.93 | 0.51 | 6.28 | 78.18 | 29.84 | 336.2 | " |
| 15 | 1.178 | 0.18 | 4.44 | 3.73 | 15.13 | 259.8 | 199.6 | " |
| 15 | 1.151 | 0.30 | 3.09 | 4.56 | 25.22 | 180.8 | 244.1 | a + c |
| 15 | 1.128 | 0.51 | 1.68 | 5.45 | 42.87 | 98.28 | 291.7 | " |
| 15 | 1.112 | 0.99 | 0.35 | 5.65 | 83.22 | 20.47 | 302.4 | a + b |
| 15 | 1.108 | 1.07 | 0.20 | 5.21 | 89.95 | 11.70 | 278.9 | " |
| 15 | 1.106 | 1.12 | 0.11 | 4.92 | 94.14 | 6.44 | 263.4 | " |
| 15 | 1.101 | 1.16 | 0.14 | 4.00 | 97.52 | 8.19 | 214.1 | " |
| 15 | 1.090 | 0.93 | 0.95 | 2.03 | 78.18 | 55.58 | 108.6 | " |

a = NaHCO₃,

b = NH₄HCO₃,

c = NH₄Cl.

AMMONIUM URANYL CARBONATE 2(NH₄)₂CO₃UO₂CO₃.

(Ebelmen.)

100 grams H₂O dissolve 5 grams of the salt at 15°.

AMMONIUM LEAD COBALTICYANIDE NH₄PbCo(CN)₆·3H₂O.

(Schuler — Sitz. Ber. K. Akad. W. (Berlin) 79, 302.)

100 grams H₂O dissolve 12.0 grams of the salt at 18°.

AMMONIUM CHLORIDE NH₄Cl.

SOLUBILITY IN WATER.

(Mulder; below 0°, Meerburg — Z. anorg. Ch. 37, 203, 1903.)

| t°. | Gms. NH ₄ Cl per 100 Gms. | | t°. | Gms. NH ₄ Cl per 100 Gms. | |
|-------|--------------------------------------|--------|-------|--------------------------------------|--------|
| | Solution. | Water. | | Solution. | Water. |
| -15 | 19.7 | 24.5 | 40 | 31.4 | 45.8 |
| -10.9 | 20.3 | 25.5 | 50 | 33.5 | 50.4 |
| -5.7 | 21.7 | 27.7 | 60 | 35.6 | 55.2 |
| 0 | 22.7 | 29.4 | 70 | 37.6 | 60.2 |
| + 5 | 23.8 | 31.2 | 80 | 39.6 | 65.6 |
| 10 | 24.9 | 33.3 | 90 | 41.6 | 71.3 |
| 15 | 26.0 | 35.2 | 100 | 43.6 | 77.3 |
| 20 | 27.1 | 37.2 | 110 | 45.6 | 83.8 |
| 25 | 28.2 | 39.3 | 115.6 | 46.6 | 87.3 |
| 30 | 29.3 | 41.4 | | | |

Density of saturated solution at 0° = 1.088, at 15° = 1.077, at 19° = 1.075.

SOLUBILITY OF AMMONIUM CHLORIDE IN AQUEOUS AMMONIUM BICARBONATE SOLUTIONS SATURATED WITH CO_2 .

(Fedotieff — Z. phys. Ch. 49, 169, 1904.)

| t°. | Wt. of 1 cc. Sol. | Per 1000 cc. Solution. | | | | Per 1000 Gms. H_2O . | | | |
|-----|----------------------|--------------------------------------|-----------------------------------|-------------------------------------|----------------------------------|--------------------------------------|-----------------------------------|-----------------------------------|----------------------------------|
| | | G. M. NH_4HCO_3 . | G. M. NH_4Cl . | Gms. NH_4HCO_3 . | Gms. NH_4Cl . | G. M. NH_4HCO_3 . | G. M. NH_4Cl . | Gms. NH_4HCl . | Gms. NH_4Cl . |
| 0 | 1.069 | 0.0 | 4.60 | 0.0 | 246.1 | 0.0 | 5.57 | 0.0 | 298.0 |
| 0 | 1.077 | 0.37 | 4.41 | 29.2 | 235.9 | 0.46 | 5.42 | 36.0 | 290.8 |
| 15 | 1.077 | 0.0 | 5.29 | 0.0 | 283.1 | 0.0 | 6.64 | 0.0 | 355.0 |
| 15 | 1.085 | 0.62 | 4.95 | 48.9 | 264.8 | 0.81 | 6.40 | 64.2 | 343.5 |
| 30 | ... | ... | ... | ... | ... | 0.0 | 7.78 | 0.0 | 416.4 |
| 30 | ... | ... | ... | ... | ... | 1.15 | 7.40 | 91.0 | 397.0 |

SOLUBILITY OF AMMONIUM CHLORIDE IN AQUEOUS SOLUTIONS OF SODIUM CHLORIDE SATURATED WITH CO_2 .

(Fedotieff.)

| t°. | Wt. of 1 cc. Sol. | Per 1000 cc. Solution. | | | | Per 1000 Gms. H_2O . | | | |
|-----|----------------------|--------------------------|-----------------------------------|-------------------------|----------------------------------|--------------------------------------|-----------------------------------|-------------------------|----------------------------------|
| | | G. M. NaCl . | G. M. NH_4Cl . | Gms. NaCl . | Gms. NH_4Cl . | G. M. NaCl . | G. M. NH_4Cl . | Gms. NaCl . | Gms. NH_4Cl . |
| 0 | 1.069 | 0.0 | 4.60 | 0.0 | 246.1 | 0.0 | 5.57 | 0.0 | 298.0 |
| 0 | 1.085 | 4.04 | 2.26 | 236.5 | 121.0 | 4.89 | 2.73 | 286.4 | 146.1 |
| 15 | 1.077 | 0.0 | 5.29 | 0.0 | 283.1 | 0.0 | 6.64 | 0.0 | 355.0 |
| 15 | 1.097 | 0.81 | 4.71 | 47.5 | 252.1 | 1.02 | 5.91 | 59.8 | 316.4 |
| 15 | 1.120 | 1.68 | 4.13 | 98.0 | 221.7 | 2.09 | 5.18 | 122.4 | 277.0 |
| 15 | 1.153 | 2.87 | 3.38 | 168.0 | 180.7 | 3.57 | 4.20 | 208.9 | 224.7 |
| 15 | 1.175 | 3.65 | 2.98 | 213.5 | 159.4 | 4.55 | 3.72 | 266.8 | 198.8 |
| 30 | ... | ... | ... | ... | ... | 0.0 | 7.78 | 0.0 | 416.4 |
| 30 | 1.166 | 3.30 | 3.70 | 193.0 | 198.0 | 4.26 | 4.77 | 249.0 | 255.4 |
| 45 | ... | ... | ... | ... | ... | 0.0 | 9.03 | 0.0 | 483.7 |
| 45 | ... | ... | ... | ... | ... | 4.0 | 6.02 | 233.9 | 322.1 |

SOLUBILITY OF AMMONIUM CHLORIDE IN AQUEOUS SOLUTIONS OF HYDROCHLORIC ACID AT 0°.

(Engel — Ann. chim. phys. [6] 13, 379, '88.)

| Sp. Gr. of Solutions. | Milligram Molecules per 10 cc. Solution. | | Grams per 100 cc. Solution. | |
|--------------------------|---|--------------------------|--------------------------------|--------------------------|
| | HCl. | NH_4Cl . | HCl. | NH_4Cl . |
| 1.076 | 0.0 | 46.12 | 0.0 | 24.61 |
| 1.069 | 2.9 | 43.6 | 1.05 | 23.16 |
| 1.070 | 5.5 | 41.0 | 1.99 | 21.78 |
| 1.071 | 7.85 | 39.15 | 2.84 | 20.79 |
| 1.073 | 10.85 | 36.45 | 3.93 | 19.36 |
| 1.078 | 21.4 | 27.37 | 7.74 | 14.54 |
| 1.106 | 53.0 | 10.87 | 19.18 | 5.78 |
| 1.114 | 61.0 | 8.8 | 22.07 | 4.67 |

Sat. HCl at 12° 3.7 at 17°

SOLUBILITY IN AQUEOUS AMMONIA SOLUTIONS AT 0°.

(Engel — Bull. soc. chim. [3] 6, 17, 1891.)

| Sp. Gr. of Solutions. | Milligram Molecules per 10 cc. Solution. | | Grams per 100 cc. Solution. | |
|-----------------------|--|---------------------|-----------------------------|---------------------|
| | NH ₃ . | NH ₄ Cl. | NH ₄ OH. | NH ₄ Cl. |
| 1.067 | 5.37 | 45.8 | 0.92 | 24.52 |
| 1.054 | 12.02 | 45.5 | 2.05 | 24.35 |
| 1.031 | 38.0 | 44.5 | 6.48 | 23.82 |
| 1.025 | 47.0 | 44.0 | 8.02 | 23.56 |
| 1.017 | 54.5 | 43.63 | 9.30 | 23.35 |
| 0.993 | 80.0 | 43.12 | 13.66 | 23.09 |
| 0.992 | 90.0 | 44.0 | 15.36 | 23.56 |
| 0.983 | 95.5 | 44.37 | 16.29 | 23.75 |
| 0.953 | 130.0 | 49.75 | 22.18 | 26.63 |
| 0.931 | 169.75 | 60.0 | 28.97 | 32.14 |

SOLUBILITIES OF MIXTURES OF AMMONIUM CHLORIDE AND OTHER SALTS IN WATER.

(Rüdorff, Karsten, Mulder.)

Both salts present in solid phase.

| t°. | Grams per 100 Grams H ₂ O. | | | | t°. | Grams per 100 Grams H ₂ O. | | | |
|------|---------------------------------------|----------------------|--------|---|--------|---------------------------------------|----------------------|--------|----------------------------------|
| 19.5 | 29.2 | NH ₄ Cl + | 174.0 | NH ₄ NO ₃ R | b. pt. | 67.7 | NH ₄ Cl + | 21.9 | KCl M |
| 21.5 | 26.8 | " | + 46.5 | (NH ₄) ₂ SO ₄ R | 14.8 | 38.8 | " | + 34.2 | KNO ₃ K |
| 20.0 | 33.8 | " | + 11.6 | BaCl ₂ R | 18.5 | 39.8 | " | + 38.6 | KNO ₃ K |
| 18.5 | 39.2 | " | + 17.0 | Ba(NO ₃) ₂ K | 14.0 | 36.8 | " | + 14.1 | K ₂ SO ₄ R |
| 15.0 | 28.9 | " | + 16.9 | KCl R | 18.7 | 37.9 | " | + 13.3 | K ₂ SO ₄ K |
| 22.0 | 30.4 | " | + 19.1 | KCl R | 18.7 | 22.9 | " | + 23.9 | NaCl R |

SOLUBILITY OF AMMONIUM CHLORIDE IN ABSOLUTE ETHYL AND METHYL ALCOHOL AT 19° AND IN AQUEOUS ETHYL ALCOHOL SOLUTIONS.

100 grams absolute ethyl alcohol dissolve 0.62 grams NH₄Cl.100 grams absolute methyl alcohol dissolve 3.35 grams NH₄Cl.

(de Bruyn — Rec. trav. chim. 11, 156, '92.)

In Aqueous Alcohol at 30°.

(Bathrick — J. Physic. Chem. 1, 150, '96.)

| Wt. per cent Alcohol. | G. NH ₄ Cl per 100 g. Alcohol. | Wt. per cent Alcohol. | G. NH ₄ Cl per 100 g. Alcohol. |
|-----------------------|---|-----------------------|---|
| 0 | 40.4 | 45.9 | 17.0 |
| 8.3 | 35.3 | 54.3 | 14.0 |
| 16.9 | 31.8 | 65.0 | 9.6 |
| 25.9 | 27.5 | 75.6 | 6.4 |
| 34.4 | 21.7 | 87.9 | 2.9 |

In Aq. Alcohol of 45 Wt. %.

(Gerardin — Ann. chim. phys. [4] 5, 147, '65.)

| t°. | G. NH ₄ Cl per 100 g. Alcohol. |
|-----|---|
| 4 | 11.2 |
| 8 | 12.6 |
| 27 | 19.4 |
| 38 | 23.6 |
| 56 | 30.1 |

SOLUBILITY OF AMMONIUM CHLORIDE IN AQUEOUS GLYCERINE SOLUTIONS AND IN AQUEOUS ACETONE SOLUTIONS AT 25°.

(Herz and Knoch — Z. anorg. Chem. 45, 263, 267, '05.)

In Aqueous Glycerine.

(Sp. Gr. of Glycerine 1.255, Impurity about 1.5%.)

| Wt. % Glycerine. | NH ₄ Cl per 100 cc. Solution. | | Sp. Gr. at 25° 4°. |
|---------------------|---|--------|--------------------------|
| | Millimols. | Grams. | |
| 0. | 585.1 | 31.32 | 1.0793 |
| 13.28 | 544.6 | 29.16 | 1.0947 |
| 25.98 | 502.9 | 26.93 | 1.1127 |
| 45.36 | 434.4 | 23.26 | 1.1452 |
| 54.23 | 403.5 | 21.60 | 1.1606 |
| 83.84 | 291.4 | 15.60 | 1.2225 |
| 100.00 | 228.4 | 12.23 | 1.2617 |

In Aqueous Acetone.

| Vol. % Acetone. | NH ₄ Cl per 100 cc. Solution. | | Sp. Gr. at 25° 4°. |
|--------------------|---|--------|--------------------------|
| | Millimols. | Grams. | |
| 0 | 585.1 | 31.32 | 1.0793 |
| 10 | 534.1 | 28.59 | 1.0618 |
| 20 | 464.6 | 24.87 | 1.0451 |
| 30 | 396.7 | 21.23 | 1.0263 |
| 40 | 328.5 | 17.59 | 0.9998 |
| *46.5 L | 283.7 | 15.19 | 0.9800 |
| *85.7 U | 18.9 | 1.01 | 0.8390 |
| 90 | 9.4 | 0.50 | 0.8274 |

* Between these two concentrations of acetone, the solution separates into two layers. L indicates lower layer, U indicates upper layer.

Solubility of Tetra Ethyl AMMONIUM CHLORIDE $N(C_2H_5)_4Cl$, and also of Tetra Methyl Ammonium Chloride $N(CH_3)_4Cl$ in Acetonitril.

100 cc. sat. solution in CH_3CN contain 29.31 gms. $N(C_2H_5)_4Cl$ at 25°.100 cc. sat. solution in CH_3CN contain 0.265 gms. $N(CH_3)_4Cl$ at 25°.

(Walden — Z. physik. Chem. 55, 712, '06.)

AMMONIUM CHROMATES.

SOLUBILITY IN WATER AT 30°.

(Schreinemaker — Z. physik. Chem. 55, 89, '06.)

| Composition in Wt. per cent of: | | | | Solid Phase. |
|---------------------------------|---------------------|----------------------|---------------------|---|
| The Solution. | | The Residue. | | |
| % CrO ₃ . | % NH ₃ . | % CrO ₃ . | % NH ₃ . | |
| 6.933 | 22.23 | ... | ... | (NH ₄) ₂ CrO ₄ |
| 9.966 | 16.53 | 47.59 | 20.44 | " |
| 16.973 | 8.20 | ... | ... | " |
| 22.53 | 6.37 | 38.03 | 12.15 | " |
| 27.09 | 6.87 | 48.02 | 12.01 | (NH ₄) ₂ CrO ₄ + (NH ₄) ₂ Cr ₂ O ₇ |
| 26.19 | 5.70 | 47.38 | 8.81 | (NH ₄) ₂ Cr ₂ O ₇ |
| 25.99 | 5.10 | 41.56 | 7.58 | " |
| 30.16 | 3.50 | ... | ... | " |
| 38.89 | 3.10 | 61.08 | 8.80 | " |
| 42.44 | 3.15 | 59.72 | 6.75 | (NH ₄) ₂ Cr ₂ O ₇ + (NH ₄) ₂ Cr ₃ O ₁₀ |
| 44.08 | 2.27 | 54.90 | 4.14 | (NH ₄) ₂ Cr ₃ O ₁₀ |
| 52.91 | 1.11 | 60.88 | 3.09 | " |
| 54.56 | 1.03 | 63.07 | 3.09 | (NH ₄) ₂ Cr ₃ O ₁₀ + (NH ₄) ₂ Cr ₄ O ₁₃ |
| 56.57 | 0.97 | 65.70 | 2.95 | (NH ₄) ₂ Cr ₄ O ₁₃ |
| 58.87 | 0.65 | 69.74 | 3.24 | " |
| 62.48 | 0.46 | 71.93 | 3.10 | " |
| 63.60 | 0.40 | 73.68 | 1.18 | (NH ₄) ₂ Cr ₄ O ₁₃ + CrO ₃ |
| 63.66 | 0.41 | 71.47 | 2.07 | " |
| 62.94 | 0.21 | ... | ... | CrO ₃ |
| 62.28 | 0.0 | ... | ... | CrO ₃ |

100 gms. of the sat. aq. solution contain 28.80 gms. (NH₄)₂CrO₄ at 30°.100 gms. of the sat. aq. solution contain 32.05 gms. (NH₄)₂Cr₂O₇ at 30°.

AMMONIUM FLUOBORIDE 26

AMMONIUM FLUOBORIDE NH_4BF_4 .

100 parts of water dissolve 25 parts salt at 16° , and about 97 parts at b. pt.

(Stolba — Chem. Techn. Cent. Anz. 7, 459.)

AMMONIUM FORMATE HCOONH_4 , and also Ammonium Acid Formate.

SOLUBILITY IN WATER. (Groschuff — Ber. 36, 4351, '03.)

| t° . | Gms. HCOONH_4 per 100 Gms. Solution. Water. | Solid. Phase. | t° . | Gms. per 100 Gms. Solution. | Solid. Phase. |
|-------------|--|-------------------|-------------|------------------------------------|-------------------------------------|
| | | | | $\text{HCOONH}_4 + \text{HCOOH}$. | |
| -20 | 41.9 72 | HCOONH_4 | -6.5 | 46.7 34.1 | $\text{HCOONH}_4, \text{HCOOH}$ |
| 0 | 50.5 102 | " | +1.5 | 49.6 36.2 | " |
| 20 | 58.9 143 | " | 6.0 | 51.3 37.4 | " |
| 40 | 67.1 204 | " | 8.5 | 52.1 38.0 | " |
| 60 | 75.7 311 | " | -7 | 49.6 36.2 | HCOONH_4 labil. |
| 80 | 84.2 531 | " | +13 | 53.0 38.6 | " stabil. |
| 116 f. pt. | | | 29 | 55.8 40.7 | " |
| | | | 39 | 57.8 42.2 | H_2O free solution. |

SOLUBILITY OF AMMONIUM FORMATE IN FORMIC ACID SOLUTIONS. (Groschuff.)

30 grams of HCOONH_4 dissolved in weighed amounts of formic acid and cooled to the point at which a solid phase separated.

| t° . | Gms. HCOONH_4 per 100 Gms. Solution. | G. M. HCOONH_4 per 100 G. M. HCOOH . | Solid Phase. | t° . | Gms. HCOONH_4 per 100 Gms. Solution. | G. M. HCOONH_4 per 100 G. M. HCOOH . | Solid Phase. |
|-------------|--|--|-------------------|-------------|--|--|--------------------------|
| -3 | 35.3 | 39.9 | HCOONH_4 | 11 | 50.0 | 73.0 | HCOONH_4 labil. |
| | | | HCOOH | 39 | 57.8 | 100.0 | " stabil. |
| +8.5 | 40.6 | 49.9 | " | 78 | 73.1 | 199.0 | " |
| 21.5 | 50.0 | 73.0 | " | 116 m.pt. | 100.0 | ∞ | " |

AMMONIUM IODATE NH_4IO_3 .

100 parts H_2O dissolve 2.6 parts salt at 15° and 14.5 parts at 100° .

(Rammelsberg — Pogg. Ann. 44, 555, 1838.)

Tetra Methyl AMMONIUM IODIDE $\text{N}(\text{CH}_3)_4\text{I}$.

SOLUBILITY IN SEVERAL SOLVENTS. (Walden — Z. physik. Chem. 55, 708, '06.)

| Solvent. | Formula. | t° . | Sp. Gr. of Solution. | Gms. $\text{N}(\text{CH}_3)_4\text{I}$ per 100. cc. Solution. | Gms. Solution. |
|------------------|---|-------------|-------------------------|--|-------------------|
| Water | H_2O | 0 | 1.0188 | 2.01 | 1.97 |
| Water | H_2O | 25 | 1.0155 | 5.31-5.89 | 5.22 |
| Methyl Alcohol | CH_3OH | 0 | 0.8025 | 0.18-0.22 | 0.22 |
| Methyl Alcohol | CH_3OH | 25 | 0.7920 | 0.38-0.42 | 0.48 |
| Ethyl Alcohol | $\text{C}_2\text{H}_5\text{OH}$ | 25 | 0.7894 | 0.09 | ... |
| Glycol | $(\text{CH}_2\text{OH})_2$ | 0 | ... | 1.014 | ... |
| Glycol | $(\text{CH}_2\text{OH})_2$ | 25 | 1.0678 | 0.240 | 0.224 |
| Acetonitril | CH_3CN | 25 | ... | 0.650 | ... |
| Nitro Methane | CH_3NO_2 | 0 | 1.1387 | 0.25-0.32 | 0.22 |
| Nitro Methane | CH_3NO_2 | 25 | 1.1285 | 0.34-0.38 | 0.21 |
| Acetone | $(\text{CH}_3)_2\text{CO}$ | 0 | ... | 0.118 | ... |
| Acetone | $(\text{CH}_3)_2\text{CO}$ | 25 | ... | 0.187 | ... |
| Salicyl Aldehyde | $\text{C}_6\text{H}_4.\text{OH}.\text{COH}$ | 0 | 1.1492 | 0.302 | 0.263 |
| Salicyl Aldehyde | $\text{C}_6\text{H}_4.\text{OH}.\text{COH}$ | 25 | 1.1379 | 0.510 | 0.484 |

Tetra Ethyl AMMONIUM IODIDE $N(C_2H_5)_4I$.

SOLUBILITY IN SEVERAL SOLVENTS.

(Walden — Z. physik. Chem. 55, 699, '06.)

| Solvent. | Formula. | t °. | Sp. Gr. of Solution. | Gms. $N(C_2H_5)_4I$ per 100. | |
|-----------------------|-------------------------|------|----------------------|------------------------------|----------------|
| | | | | cc. Solution. | Gms. Solution. |
| Water | H_2O | 0 | 1.0470 | 16.31 | 15.58 |
| Water | H_2O | 25 | 1.1021 | 36.33(35.5) | 13.44 |
| Methyl Alcohol | CH_3OH | 0 | 0.8326 | 3.7-4.3 | 4.44 |
| Methyl Alcohol | CH_3OH | 25 | 0.8463 | 10.5 (10.7) | 12.29 |
| Ethyl Alcohol | C_2H_5OH | 0 | 0.7928 | 0.348 | 0.439 |
| Ethyl Alcohol | C_2H_5OH | 25 | 0.7844 | 0.98 (0.88) | 1.249 |
| Glycol | $(CH_2OH)_2$ | 0 | 1.1039 | 3.27 | 2.97 |
| Glycol | $(CH_2OH)_2$ | 25 | 1.0904 | 7.63 (7.55) | 7.00 |
| Acetonitril | CH_3CN | 0 | 0.8163 | 2.24 | 2.74 |
| Acetonitril | CH_3CN | 25 | 0.7929 | 3.04 (3.54) | 3.83 |
| Propionitril | CH_3CH_2CN | 0 | 0.8059 | 0.618 | 0.767 |
| Propionitril | CH_3CH_2CN | 25 | 0.7830 | 0.81-1.01 | 1.29 |
| Benzonitril | C_6H_5CN | 25 | ... | 0.467 | ... |
| Methyl Sulphocyanide | CH_3SCN | 25 | 1.0828 | 4.40 | 4.06 |
| Ethyl Sulphocyanide | C_2H_5SCN | 25 | 1.0012 | 0.475 | 0.47 |
| Nitro Methane | CH_3NO_2 | 0 | 1.1658 | 3.59 | 3.004 |
| Nitro Methane | CH_3NO_2 | 25 | 1.1476 | 5.61-6.27 | 5.61 |
| Nitroso Dimethylin | $(CH_3)_2N.NO$ | 25 | 1.0059 | 2.67 | 2.66 |
| Acetyl Acetone | $CH_3COCH_2COOCH_3$ | 25 | ... | 0.268 | ... |
| Furfurol | $C_4H_3O.COCH_3$ | 0 | 1.1738 | 3.91 | 3.33 |
| Furfurol | $C_4H_3O.COCH_3$ | 25 | 1.1692 | 5.33 | 4.55 |
| Benzaldehyde | C_6H_5COH | 25 | ... | 0.43 | ... |
| Salicylaldehyde | $C_6H_4.OH.COCH_3$ | 25 | ... | change-able-17.7 | ... |
| Anisaldehyde | $C_6H_4.OCH_3.COCH_3$ | 25 | ... | 0.59 | ... |
| Acetone | $(CH_3)_2CO$ | 0 | 0.7991 | 0.174 | 0.218 |
| Acetone | $(CH_3)_2CO$ | 25 | ... | 0.249 | 0.218 |
| Ethyl Acetate | $CH_3COOC_2H_5$ | 25 | ... | 0.00039 | ... |
| Ethyl Nitrate | $C_2H_5ONO_2$ | 25 | 1.0984 | 0.062 | 0.056 |
| Benzoyl Ethyl Acetate | $C_6H_5COCH_2COOC_2H_5$ | 25 | 1.1303 | 0.321 | 0.284 |
| Di-Methyl Malonate | $CH_2(COOCH_3)_2$ | 25 | 1.1335 | 0.040 | 0.035 |
| Methyl Cyan Acetate | $CH_3CNCOOCH_3$ | 0 | 1.1341 | 1.82 | 1.605 |
| Methyl Cyan Acetate | $CH_3CNCOOCH_3$ | 25 | ... | 2.83 | ... |
| Ethyl Cyan Acetate | $CH_3CNCOOC_2H_5$ | 0 | 1.0760 | 1.057 | 0.981 |
| Ethyl Cyan Acetate | $CH_3CNCOOC_2H_5$ | 25 | 1.0607 | 1.71 | 1.41 |

AMMONIUM IODIDE

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Tetra Propyl AMMONIUM IODIDE $N(C_4H_9)_4I$.

SOLUBILITY IN SEVERAL SOLVENTS.

(Walden — Z. physik. Chem. 55, 709, '06.)

| Solvent. | Formula. | t°. | Sp. Gr. of Solution. | Gms. $N(C_4H_9)_4I$ per 100. | |
|--------------------|-------------------|-----|----------------------|------------------------------|----------------|
| | | | | cc. Solution. | Gms. Solution. |
| Methyl Alcohol | CH_3OH | 0 | 0.9756 | 40.92 | 41.94 |
| Methyl Alcohol | CH_3OH | 25 | 1.0187 | 56.42 | 55.37 |
| Ethyl Alcohol | C_2H_5OH | 0 | 0.8349 | 6.5-6.8 | 8.14 |
| Ethyl Alcohol | C_2H_5OH | 25 | 0.8716 | 19.88-20.29 | 23.28 |
| Acetonitril | CH_3CN | 0 | 0.8553 | 13.03 | 15.24 |
| Acetonitril | CH_3CN | 25 | 0.8584 | 18.69 | 21.77 |
| Propionitril | C_3H_7CN | 0 | 0.8280 | 6.37 | 7.66 |
| Propionitril | C_3H_7CN | 25 | 0.8191 | 9.65 | 11.76 |
| Benzonitril | C_6H_5CN | 25 | 1.0199 | 8.44 | 8.35 |
| Nitro Methane | CH_3NO_2 | 0 | 1.181 | 14.79 | 12.52 |
| Nitro Methane | CH_3NO_2 | 25 | 1.158 | 22.24 | 19.21 |
| Nitro Benzol | $C_6H_5NO_2$ | 25 | 1.193 | 5.71 | 4.79 |
| Benzaldehyde | C_6H_5COH | 0 | 1.0581 | 7.06 | 6.67 |
| Benzaldehyde | C_6H_5COH | 25 | 1.0549 | 9.87 | 9.35 |
| Anisaldehyde | $C_6H_5OCH_3COH$ | 0 | 1.1114 | 5.60 | 5.04 |
| Anisaldehyde | $C_6H_5OCH_3COH$ | 25 | 1.1004 | 6.75 | 6.14 |
| Salicylaldehyde | $C_6H_5OH.COH$ | 52 | ... | 39.28 | ... |
| Ethylnitrite | C_2H_5ONO | 0 | 1.1207 | 0.522 | 0.466 |
| Ethylnitrite | C_2H_5ONO | 25 | 1.1025 | 0.653 | 0.592 |
| Di-Methyl Malonate | $CH_2(COOCH_3)_2$ | 0 | 1.1532 | 0.298 | 0.259 |
| Di-Methyl Malonate | $CH_2(COOCH_3)_2$ | 25 | 1.1345 | 0.320 | 0.282 |
| Acetone | $(CH_3)_2C=O$ | 0 | 0.8259 | 2.692 | 3.26 |
| Acetone | $(CH_3)_2C=O$ | 25 | 0.8049 | 3.944 | 4.90 |
| Ethyl Acetate | $CH_3COOC_2H_5$ | 25 | 0.8975 | 0.0063 | 0.007 |

AMMONIUM NITRATE NH_4NO_3 .

SOLUBILITY IN WATER.

(Schwarz — Ostwald's Lehrbuch, 2d ed. p. 425; Muller and Kaufmann — Z. physik. Chem. 42, 497, '01-'02.)

| t°. | Sp. Gr. Solution. | G. Mols. NH_4NO_3 per 100 Mols. H_2O . | Gms. NH_4NO_3 per 100 Gms. | | Solid Phase. |
|-------|-------------------|--|------------------------------|--------|---|
| | | | Solution. | Water. | |
| 0 | ... | 26.63 | 54.19 | 118.3 | NH_4NO_3 rhomb. β |
| 12.2 | 1.2945 | 34.50 | 60.53 | 153.4 | " |
| 20.2 | 1.3116 | 43.30 | 65.80 | 192.4 | " |
| 25.0 | 1.3197 | 48.19 | 68.17 | 214.2 | " |
| 30.0 | 1.3299 | 54.40 | 70.73 | 241.8 | " |
| 32.1 | 1.3344 | 57.60 | 71.97 | 256.9 | NH_4NO_3 rhomb. β + rhomb. α |
| 35.0 | 1.3394 | 59.80 | 72.64 | 265.8 | NH_4NO_3 rhomb. α |
| 40.0 | 1.3464 | 66.80 | 74.82 | 297.0 | " |
| 50.0 | ... | 77.41 | 77.49 | 344.0 | " |
| 60.0 | ... | 94.73 | 80.81 | 421.0 | " |
| 70.0 | ... | 112.30 | 83.32 | 499.0 | " |
| 80.0 | ... | 130.50 | 85.25 | 580.0 | " |
| 90.0 | ... | 166.50 | 88.08 | 740.0 | NH_4NO_3 rhombohedral? |
| 100.0 | ... | 196.00 | 89.71 | 871.0 | " |

SOLUBILITIES OF MIXTURES OF AMMONIUM NITRATE AND OTHER SALTS.

(Rüdorff — Mulder.)

| |
|---|
| 100 gms. H ₂ O dissolve 162.9 gms. NH ₄ NO ₃ + 77.1 gms. NaNO ₃ at 16° R. |
| 100 gms. H ₂ O dissolve 88.8 gms. NH ₄ NO ₃ + 40.6 gms. KNO ₃ at 9° M. |
| 100 gms. H ₂ O dissolve 101.3 gms. NH ₄ NO ₃ + 6.2 gms. Ba(NO ₃) ₂ at 9° M. |

SOLUBILITY OF AMMONIUM NITRATE IN AMMONIA.

(Kuriloff — Z. physik. Chem. 25, 109, '98.)

| t°. | Gms. NH ₄ NO ₃ . | Gms. NH ₃ . | Mols. NH ₄ NO ₃ per 100 Mols. NH ₄ NO ₃ + NH ₃ . | t°. | Gms. NH ₄ NO ₃ . | Gms. NH ₃ . | Mols. NH ₄ NO ₃ per 100 Mols. NH ₄ NO ₃ + NH ₃ . |
|-------|--|------------------------|---|-------|--|------------------------|---|
| -80 | 0 | 100 | 0.0 | 33.3 | 0.9358 | 0.2352 | 45.9 |
| -60 | 1.3918 | 4.4327 | 6.25 | 35.9 | 0.7746 | 0.1857 | 47.0 |
| -44.5 | 0.9526 | 1.2457 | 13.9 | 68.8 | 4.2615 | 0.7747 | 53.8 |
| -30 | 0.8308 | 0.3700 | 32.3 | 94.0 | 0.6439 | 0.0665 | 67.3 |
| -10.5 | 0.9675 | 0.3515 | 36.9 | 190.8 | 0.7578 | 0.0588 | 74.2 |
| 0 | 0.7600 | 0.2607 | 38.3 | 168.0 | ... | ... | 100.0 |

t° = temperature of equilibrium between solution and solid phase.

SOLUBILITY OF AMMONIUM NITRATE IN NITRIC ACID.

(Groeschuff — Ber. 37, 1488, '04.)

Determinations by the "Synthetic Method," see Note, page 9.

| t°. | Gms. NH ₄ NO ₃ per 100 Gms. Sol. | Mols. NH ₄ NO ₃ per 100 Mols. HNO ₃ . | Solid Phase. | t°. | Gms. NH ₄ NO ₃ per 100 Gms. Sol. | Mols. NH ₄ NO ₃ per 100 Mols. HNO ₃ . | Solid Phase. |
|------------|--|--|---|------|--|--|---|
| 8 | 21.1 | 21.1 | NH ₄ NO ₃ .2HNO ₃ | 11.0 | 51.7 | 84.3 | NH ₄ NO ₃ .HNO ₃ |
| 23 | 28.7 | 31.6 | " a | 12.0 | 54.7 | 95.1 | " labil. |
| 29.5 m.pt. | 38.8 | 50.0 | " | 11.5 | 57.6 | 108.0 | " b |
| 27.5 | 44.6 | 63.4 | " b | 11.5 | 54.0 | 92.4 | NH ₄ NO ₃ labil. |
| 23.5 | 49.4 | 76.8 | " | 17.0 | 54.7 | 95.1 | " stabil. |
| 17.5 | 54.0 | 92.4 | " | 27.0 | 56.2 | 101.0 | " |
| 16.5 | 54.3 | 93.5 | " | 49.0 | 60.4 | 120.0 | " |
| 4.0 | 45.8 | 66.7 | NH ₄ NO ₃ .HNO ₃ labil | 79.0 | 68.1 | 168.0 | " |

a = solution in HNO₃,b = solution in NH₄NO₃.

SOLUBILITY OF AMMONIUM TRI-NITRATE IN WATER.

(Groeschuff.)

| t°. | Gms. NH ₄ NO ₃ per 100 Gms. Solution. | Gms. HNO ₃ per 100 Gms. Solution. | Mols. NH ₄ NO ₃ * per 100 Mols. H ₂ O. | Mols. NH ₄ NO ₃ per 100 total Mols. Solution. | Solid Phase. |
|-------------|---|--|---|---|--|
| -8 | 34.2 | 53.9 | 64.3 | 22.0 | NH ₄ NO ₃ .2HNO ₃ |
| -2.5 | 34.8 | 54.8 | 75.1 | 23.1 | " |
| +3.0 | 35.4 | 55.8 | 90.0 | 24.3 | " |
| 8.5 | 36.6 | 56.9 | 113.0 | 25.7 | " |
| 19.5 | 37.4 | 58.9 | 225.0 | 29.0 | " |
| 25.0 | 38.1 | 60.0 | 450.0 | 31.0 | " |
| 29.5 m. pt. | 38.8 | 61.2 | 0.0 | ∞ | " |

* or NH₄NO₃.2HNO₃.

AMMONIUM NITRATE

30

SOLUBILITY OF AMMONIUM NITRATE IN AQUEOUS ETHYL ALCOHOL.

(Fleckenstein — *Physic. Z.* 6, 419, '05.)

| t°. | Grams of NH_4NO_3 Dissolved per 100 Grams Aq. Alcohol of (Wt. %). | | | | | |
|-----|---|---------|---------|---------|---------|-----|
| | 100%. | 86.77%. | 76.12%. | 51.65%. | 25.81%. | 0%. |
| 20 | 2.5 | 11.0 | 23.0 | 70.0 | 140 | 195 |
| 30 | 4.0 | 14.0 | 32.0 | 90.0 | 165 | 230 |
| 40 | 5.0 | 18.0 | 43.0 | 115.0 | 196 | 277 |
| 50 | 6.0 | 24.0 | 55.0 | 144.0 | 244 | 365 |
| 60 | 7.5 | 30.0 | 70.0 | 183.0 | 320 | ... |
| 70 | 9.0 | 41.0 | 93.0 | 230.0 | ... | ... |
| 80 | 10.5 | 56.0 | ... | ... | ... | ... |

NOTE. — The figures in the preceding table were read from curves shown in the abridged report of the work, and are therefore only approximately correct. Determinations of the solubility in methyl alcohol solutions were also made but not quoted in the abstract. The "Synthetic Method" (see Note, page 9) was used.

100 grams absolute ethyl alcohol dissolve 4.6 grams NH_4NO_3 at 14° and 3.8 grams at 20.5°.

100 grams absolute methyl alcohol dissolve 14.6 grams NH_4NO_3 at 14° and 17.1 grams at 20.5°.

(Schiff and Monsacchi — *Z. physik. Chem.* 21, 277, '96; at 20.5° de Bruyn — *Ibid.*, 10, 783, '92.)

AMMONIUM MAGNESIUM NITRATE $2\text{NH}_4\text{NO}_3 \cdot \text{Mg}(\text{NO}_3)_2$.

100 parts water dissolve 10 parts salt at 12.5°.

(Foucaud.)

AMMONIUM MANGANIO MOLYBDATE $5(\text{NH}_4)_2\text{MoO}_4 \cdot \text{Mn}_2(\text{Mo}_2\text{O}_7)_2 \cdot 12\text{H}_2\text{O}$.

100 parts water dissolve 0.98 parts salt at 17°.

(Struve — *J. pr. Chem.* 61, 460, '54.)

AMMONIUM OXALATE $(\text{NH}_4)_2\text{C}_2\text{O}_4$.

100 grams H_2O dissolve 2.215 grams $(\text{NH}_4)_2\text{C}_2\text{O}_4$ at 0° Sp. Gr. of solution = 1.0105.

(Engel — *Ann. chim. phys.* [6] 13, 359, '88.)

SOLUBILITY OF NEUTRAL AMMONIUM OXALATE IN AQUEOUS SOLUTIONS OF ACID AMMONIUM OXALATE.

(Engel.)

| $\frac{1}{2}$ Milligram Mols. per 10 cc. Solution. | | Grams per 100 cc. Solution. | |
|--|------------------------------------|---------------------------------------|------------------------------------|
| $(\text{NH}_4)_2\text{C}_2\text{O}_4$ | $\text{NH}_4\text{HC}_2\text{O}_4$ | $(\text{NH}_4)_2\text{C}_2\text{O}_4$ | $\text{NH}_4\text{HC}_2\text{O}_4$ |
| 3.54 | 0.0 | 2.19 | 0.0 |
| 2.65 | 1.45 | 1.63 | 0.77 |
| 2.475 | 2.525 | 1.52 | 1.34 |
| 2.38 | 2.90 | 1.47 | 1.54* |

* Both salts present in solid phase

SOLUBILITY OF AMMONIUM OXALATE AND OXALIC ACID IN WATER AT 25°.

(Walden — Am. Ch. J. 34, 149, '05.)

Mixtures of the two substances were dissolved in warm water and the solutions allowed to cool in a thermostat held at 25°.

| Composition of Solution. | | | | Solid Phase. |
|--|-------|--|-------|---|
| Grams per 100 Gms. Solution. | | Mols. per 100 Mols. H ₂ O. | | |
| (NH ₄) ₂ C ₂ O ₄ . H ₂ C ₂ O ₄ . | | (NH ₄) ₂ C ₂ O ₄ . H ₂ C ₂ O ₄ . | | |
| 0.28 | 10.20 | 0.045 | 2.281 | H ₂ C ₂ O ₄ .2H ₂ O and (NH ₄) ₂ C ₂ O ₄ .3H ₂ C ₂ O ₄ .4H ₂ O |
| 0.46 | 7.24 | 0.072 | 1.570 | |
| 2.44 | 2.59 | 0.372 | 0.546 | Double salt, (NH ₄) ₂ C ₂ O ₄ .3H ₂ C ₂ O ₄ .4H ₂ O |
| 3.65 | 2.80 | 0.566 | 0.599 | |
| 4.99 | 3.41 | 0.791 | 0.745 | (NH ₄) ₂ C ₂ O ₄ .3H ₂ C ₂ O ₄ .4H ₂ O and (NH ₄) ₂ C ₂ O ₄ .H ₂ C ₂ O ₄ .H ₂ O |
| 5.20 | 3.55 | 0.824 | 0.781 | |
| 5.36 | 3.38 | 0.853 | 0.741 | Double salt, (NH ₄) ₂ C ₂ O ₄ .H ₂ C ₂ O ₄ .H ₂ O |
| 6.27 | 3.04 | 1.00 | 0.671 | |
| 7.03 | 2.90 | 1.13 | 0.645 | (NH ₄) ₂ C ₂ O ₄ .H ₂ C ₂ O ₄ .H ₂ O and (NH ₄) ₂ C ₂ O ₄ |
| 7.08 | 2.70 | 1.14 | 0.599 | |
| 6.92 | ... | 0.775 | ... | (NH ₄) ₂ C ₂ O ₄ |

AMMONIUM HYDROGEN PHOSPHITE (NH₄H)HPO₃.

100 grams water dissolve 171 grams (NH₄H)HPO₃ at 0°, 190 grams at 14.5° and 260 grams at 31°.

(Amat. — Compt. rend. 105, 809, '87.)

AMMONIUM PERMANGANATE NH₄MnO₄.

100 parts water dissolve approximately 8 parts of NH₄MnO₄ at 15°.

(Aschoff.)

AMMONIUM FLUO SILICATE (NH₄)₂SiF₆.

100 parts water dissolve 18.5 parts (NH₄)₂SiF₆ at 17.5°, Sp. Gr. 1.096.

(Stolba — Chem. Centr. 418, 1877.)

AMMONIUM SALICYLATE C₆H₄(OH)COONH₄.

100 parts H₂O dissolve 111.1 parts C₆H₄(OH)COONH₄ at 25°; 100 parts alcohol dissolve 43.5 parts at 25° and 100 parts at the b. pt. (U. S. P.)

AMMONIUM SULPHATE (NH₄)₂SO₄.

SOLUBILITY IN WATER.

(Mulder.)

| t°. | Grams (NH ₄) ₂ SO ₄ per 100 Grams. | | t°. | Grams (NH ₄) ₂ SO ₄ per 100 Grams. | |
|-----|--|-----------|-------|--|-----------|
| | Water. | Solution. | | Water. | Solution. |
| 0 | 70.6 | 41.4 | 30 | 78.0 | 43.8 |
| 5 | 71.8 | 41.8 | 40 | 81.0 | 44.8 |
| 10 | 73.0 | 42.2 | 60 | 88.0 | 46.8 |
| 15 | 74.2 | 42.6 | 80 | 95.3 | 48.8 |
| 20 | 75.4 | 43.0 | 100 | 103.3 | 50.8 |
| 25 | 76.7 | 43.4 | 108.9 | 107.5 | 51.8 |

Sp. Gr. of saturated solution at 15° = 1.248; at 19° = 1.241.

SOLUBILITY OF MIXTURES OF AMMONIUM SULPHATE AND COPPER
SULPHATE AT 16°, AND OF AMMONIUM SULPHATE AND
POTASSIUM SULPHATE AT 19.1°.

(Rüdorff — Ber. 6, 482, '73.)

| (NH ₄) ₂ SO ₄ + CuSO ₄ . | | | (NH ₄) ₂ SO ₄ + K ₂ SO ₄ . | | |
|---|-------------------------|---|--|--------------------------------|---|
| Preparation of Solution. | G. per 100 g. Solution. | | Preparation of Solution. | G. per 100 g. Solution. | |
| | CuSO ₄ | (NH ₄) ₂ SO ₄ | | K ₂ SO ₄ | (NH ₄) ₂ SO ₄ |
| Both salts in excess | 8.55 | 7.12 | Both salts in excess | 39.3 | 37.97 |
| 15 cc. sat. sol. + 3 gms. | | | 15 cc. sat. sol. + 4 g. | | |
| (NH ₄) ₂ SO ₄ | 1.77 | 18.16 | K ₂ SO ₄ | 4.94 | 33.26 |
| 15 cc. sat. sol. + 3 gms. | | | 15 cc. sat. sol. + 4 g. | | |
| CuSO ₄ ·5H ₂ O | 15.85 | 5.65 | (NH ₄) ₂ SO ₄ | 2.05 | 40.80 |

SOLUBILITY OF AMMONIUM SULPHATE IN AQUEOUS ETHYL ALCOHOL
SOLUTIONS.

(Traube and Neuberg — Z. physik. Chem. 1, 510, '87; Bodländer — *Ibid.* 7, 318, '91; Schreinemaker — *Ibid.* 23, 657, '97; de Bruyn — *Ibid.* 32, 68, '00; Linebarger — Am. Ch. J. 14, 380, '92.)

| Upper Layer Results. | | Gms. C ₂ H ₅ OH per 100 Gms. Solution. | Lower Layer Results. | | |
|--|---|--|---|------|------|
| Grams per 100 Gms. Solution at 10°-40°. | | | Gms. (NH ₄) ₂ SO ₄ per 100 g. Solution at: | | |
| C ₂ H ₅ OH. | (NH ₄) ₂ SO ₄ . | | 6.5°. | 15°. | 33°. |
| 100 | 0.0 | 0 | 42.0 | 42.6 | 44 |
| 80 | 0.1 | 2.5 | 39.0 | 40.2 | ? |
| 70 | 0.3 | 5.0 | 36.2 | 37.2 | ? |
| 60 | 1.4 | 7.5 | 33.2 | 34.5 | 42 |
| 50 | 3.2 | 10.0 | 30.0 | 31.0 | 35 |
| 45 | 4.8 | 12.5 | 27.2 | 28.0 | ? |
| 40 | 6.6 | 15.0 | 24.6 | 25.2 | ? |
| 35 | 9.2 | 17.5 | 22.0 | 22.4 | ? |
| 30 | 12.2 | 20.0 | 20.0 | 20.0 | ? |
| 25 | 14.6 | | | | |

NOTE. — When ammonium sulphate is added to aqueous solutions of alcohol, it is found that for certain concentrations and temperatures the solutions separate into two liquid layers, the upper of which contains the larger percentage of alcohol.

Most of the determinations which have been made upon this system, as contained in the papers referred to above, are given in terms of grams of ammonium sulphate, of alcohol and of water per 100 grams of these three components taken together. Those results which are given in other terms can be readily calculated to this basis, and it is therefore possible to make a comparison of the several sets of determinations by plotting on cross-section paper and drawing curves through the points. In the present case the grams of alcohol per 100 grams of solution were taken as ordinates, and the grams of ammonium sulphate in the same quantity of each solution taken as abscissæ. It was found that a single curve could be drawn through practically all the points representing the upper layer solutions at the several temperatures, but the points for the solutions containing the larger amounts of water gave curves which diverged with increase of temperature. The results given for 33° in the above table are not to be accepted as correct until further work has been done.

SOLUBILITY OF AMMONIUM SULPHATE IN AQUEOUS PROPYL ALCOHOL SOLUTIONS AT 20°.

(Linebarger — Am. Ch. J. 14, 380, '92.)

| Gms. per 100 Gms. Solution. | | Gms. per 100 Gms. Solution. | |
|--------------------------------|-----------------|--------------------------------|-----------------|
| $C_3H_7OH.$ | $(NH_4)_2SO_4.$ | $C_3H_7OH.$ | $(NH_4)_2SO_4.$ |
| 70 | 0.4 | 40 | 3.2 |
| 60 | 1.0 | 30 | 4.8 |
| 50 | 2.0 | 20 | 6.7 |

AMMONIUM CADMIUM SULPHATE $(NH_4)_2Cd(SO_4)_2 \cdot 6H_2O.$

100 cc. H_2O dissolve 72.3 grams $(NH_4)_2Cd(SO_4)_2$ at 25°.

(Locke — Am. Ch. J. 27, 459, '01.)

AMMONIUM CHROMIUM SULPHATE (Alum) $(NH_4)_2Cr_2(SO_4)_4 \cdot 24H_2O.$

100 cc. H_2O dissolve 10.78 grams anhydrous or 21.21 grams hydrated salt at 25°.

(Locke — Am. Ch. J. 26, 174, '01.)

AMMONIUM COBALT SULPHATE $(NH_4)_2Co(SO_4)_2 \cdot 6H_2O.$

SOLUBILITY IN WATER.

(Tobler — Liebig's Annalen 95, 103, '55; v. Hauer — J. pr. Chem. 74, 433, '58; at 25°, Locke — Am. Ch. J. 27, 459, '01.)

| t°. | Gms. $(NH_4)_2Co(SO_4)_2$ per 100 Gms. | | t°. | Gms. $(NH_4)_2Co(SO_4)_2$ per 100 Gms. | |
|-----|---|-----------|-----|---|-----------|
| | Water. | Solution. | | Water. | Solution. |
| 0 | 6.0 | 5.7 | 40 | 22.0 | 18.0 |
| 10 | 9.5 | 8.7 | 50 | 27.0 | 21.3 |
| 20 | 13.0 | 11.5 | 60 | 33.5 | 25.1 |
| 25 | 14.72 | 12.8 | 70 | 40.0 | 28.6 |
| 30 | 17.0 | 14.5 | 80 | 49.0 | 32.9 |

NOTE. — The determinations reported by the above named investigators were plotted on cross-section paper and although considerable variations were noted, an average curve which probably represents very nearly the true conditions was drawn through them, and the above table made from this curve.

AMMONIUM COPPER SULPHATE $(NH_4)_2Cu(SO_4)_2 \cdot 6H_2O.$

100 grams H_2O dissolve 26.6 grams salt at 19°, Sp. Gr. of sol. = 1.1336

(Schiff — Liebig's Ann. 109, 326, '59.)

AMMONIUM IRON SULPHATE (Alum) $(NH_4)_2Fe_2(SO_4)_4 \cdot 24H_2O.$

100 cc. H_2O dissolve 44.15 gms. anhydrous or 124.40 gms. hydrated salt at 25°. Sp. Gr. of saturated solution at 15° = 1.203.

(Locke — Am. Ch. J. 26, 174, '01.)

AMMONIUM IRON SULPHATE (ferrous) $(NH_4)_2Fe(SO_4)_2 \cdot 6H_2O.$

SOLUBILITY IN WATER.

(Tobler; at 25°, Locke — Am. Ch. J. 27, 459, '01.)

| t°. | G. $(NH_4)_2Fe(SO_4)_2$ per 100 g. $H_2O.$ | | t°. | G. $(NH_4)_2Fe(SO_4)_2$ per 100 g. $H_2O.$ | | t°. | G. $(NH_4)_2Fe(SO_4)_2$ per 100 g. $H_2O.$ | |
|-----|---|----|-----|---|--|-----|---|--|
| | | | | | | | | |
| 0 | 12.5 | | 25 | 25.0 (T) | | 50 | 40 | |
| 15 | 20.0 | | 25 | 35.1 (L) | | 70 | 52 | |
| | | 40 | | 33.0 | | | | |

**AMMONIUM INDIUM
SULPHATE**

34

AMMONIUM INDIUM SULPHATE $(\text{NH}_4)_3\text{In}_2(\text{SO}_4)_4 \cdot 24\text{H}_2\text{O}$.

100 g. H_2O dissolve 200 gms. salt at 16° and 400 gms. at 30° .

(Rössler — J. pr. Chem. [2] 7, 14, '73.)

AMMONIUM MAGNESIUM SULPHATE $(\text{NH}_4)_2\text{Mg}(\text{SO}_4)_2 \cdot 6\text{H}_2\text{O}$.

SOLUBILITY IN WATER.

(Average curve, from results of Mulder, Tobler, Locke, at 25° .)

| t° . | G. $(\text{NH}_4)_2\text{Mg}(\text{SO}_4)_2$ per 100 Gms. | | t° . | G. $(\text{NH}_4)_2\text{Mg}(\text{SO}_4)_2$ per 100 Gms. | |
|-------------|--|-----------|-------------|--|-----------|
| | Water. | Solution. | | Water. | Solution. |
| 0 | 9.0 | 8.8 | 40 | 27.0 | 21.3 |
| 10 | 13.0 | 11.5 | 50 | 32.0 | 24.4 |
| 20 | 18.0 | 15.3 | 60 | 37.0 | 27.0 |
| 25 | 19.9 | 16.6 | 70 | 42.0 | 29.6 |
| 30 | 22.0 | 18.0 | 80 | 47.0 | 32.0 |

AMMONIUM MANGANESE SULPHATE $(\text{NH}_4)_2\text{Mn}(\text{SO}_4)_2 \cdot 6\text{H}_2\text{O}$.

100 cc. water dissolve 37.2 gms. $(\text{NH}_4)_2\text{Mn}(\text{SO}_4)_2$ at 25° .

(Locke — Am. Ch. J. 27, 459, '01.)

AMMONIUM NICKEL SULPHATE $(\text{NH}_4)_2\text{Ni}(\text{SO}_4)_2 \cdot 6\text{H}_2\text{O}$.

SOLUBILITY IN WATER.

(Average curve from Tobler, Locke, at 25° .)

| t° . | G. $(\text{NH}_4)_2\text{Ni}(\text{SO}_4)_2$ per 100 Gms. | | t° . | G. $(\text{NH}_4)_2\text{Ni}(\text{SO}_4)_2$ per 100 Gms. | |
|-------------|--|-----------|-------------|--|-----------|
| | Water. | Solution. | | Water. | Solution. |
| 0 | 1.0 | 0.99 | 40 | 12.0 | 10.72 |
| 10 | 4.0 | 3.85 | 50 | 14.5 | 12.96 |
| 20 | 6.5 | 6.10 | 60 | 17.0 | 14.53 |
| 25 | 7.57 | 7.04 | 70 | 20.0 | 16.66 |
| 30 | 9.0 | 8.45 | | | |

AMMONIUM SODIUM SULPHATE $\text{NH}_4\text{NaSO}_4 \cdot 2\text{H}_2\text{O}$.

100 gms. water dissolve 46.6 gms. $\text{NH}_4\text{NaSO}_4 \cdot 2\text{H}_2\text{O}$ at 15° , Sp. Gr. Sol. = 1.1749.

AMMONIUM VANADIUM SULPHATE (Alum) $(\text{NH}_4)_2\text{V}_2(\text{SO}_4)_4 \cdot 24\text{H}_2\text{O}$.

100 cc. H_2O dissolve 31.69 gms. anhydrous or 78.50 gms. hydrated salt at 25° .

(Locke.)

AMMONIUM ZINC SULPHATE $(\text{NH}_4)_2\text{Zn}(\text{SO}_4)_2 \cdot 6\text{H}_2\text{O}$.

SOLUBILITY IN WATER.

(Average curve, see Note, p. 33, Tobler, Locke, at 25° .)

| t° . | G. $(\text{NH}_4)_2\text{Zn}(\text{SO}_4)_2$ per 100 Gms. | | t° . | G. $(\text{NH}_4)_2\text{Zn}(\text{SO}_4)_2$ per 100 Gms. | |
|-------------|--|--------|-------------|--|--------|
| | Solution. | Water. | | Solution. | Water. |
| 0 | 6.54 | 7.0 | 40 | 16.66 | 20 |
| 10 | 8.67 | 9.5 | 50 | 20.0 | 25 |
| 20 | 11.11 | 12.5 | 60 | 23.1 | 30 |
| 25 | 12.36 | 14.1 | 70 | 25.9 | 35 |
| 30 | 13.79 | 16.0 | 80 | 29.6 | 42 |

35 AMMONIUM PERSULPHATE

AMMONIUM PERSULPHATE $(\text{NH}_4)_2\text{S}_2\text{O}_8$.

100 parts H_2O dissolve 58.2 parts $(\text{NH}_4)_2\text{S}_2\text{O}_8$ at 0° .

(Marshall — J. Chem. Soc. 59, 771, '91.)

AMMONIUM SODIUM HYDROGEN SULPHITE $(\text{NH}_4)\text{Na}_2\text{H}(\text{SO}_3)_4$.

100 gms. H_2O dissolve 42.3 gms. salt at 12.4° and 48.5° gms. at 15° .

(Schwincker — Ber. 22, 1732, '89.)

AMMONIUM SULPHOCYANIDE NH_4SCN .

100 parts water dissolve 128.1 parts NH_4SCN at 0° and 162.2 parts at 20° .

(Clowes — Z. Ch. 190, 1866.)

AMYL ACETATE BUTYRATE, FORMATE, etc.

SOLUBILITY IN WATER AND IN AQUEOUS ALCOHOL AT 20° .

(Bancroft — Phys. Rev. 3, 131, 196, 205, '95-'96; Traube. — Ber. 17, 2304, '84.)

| Ester. | cc. Ester per 100 cc. H_2O . | Sp. Gr. of Ester. | Ester. | cc. Ester per 100 cc. H_2O . | Sp. Gr. of Ester. |
|------------------|---|----------------------|------------------|---|----------------------|
| Amyl acetate | 0.2 | 0.88 | Amyl propionate | 0.1 | 0.88 |
| Iso amyl acetate | 0.2 (1.2?) | ... | Iso amyl formate | 0.3 (gms. at 22°) | |
| Amyl butyrate | 0.06 | 0.85 | | | |

Solubility of Iso Amyl Acetate in Aq. Alcohol Mixtures. Solubility of Amyl Acetate and Amyl Formate in Aq. Alcohol Mixtures.

| Per 5 cc. $\text{C}_2\text{H}_5\text{OH}$. | | cc. $\text{C}_2\text{H}_5\text{OH}$ in Mixture. | cc. H_2O added to cause separation of second phase in mixtures of the given amounts of alcohol and 3 cc. portions of: | |
|---|--------------------------|--|--|------------------|
| cc. H_2O . | cc. Iso Amyl acetate. | | Amyl Formate. | Amyl Acetate. |
| 7 | 0.41 | 3 | 1.80 | 1.76 |
| 6 | 0.7 | 9 | 8.77 | 9.03 |
| 5 | 1.31 | 15 | 17.01 | 17.52 |
| 3.61 | 3.0 | 21 | 27.06 | 26.99 |
| 3.01 | 4.0 | 27 | 38.31 | 37.23 |
| 2.60 | 5.0 | 33 | 50.71 | 48.41 |
| | | 39 | 65.21 | ... |
| | | 45 | 85.10 | ... |
| | | 48 | 94.20 | ... |

ANETHOL (p Propylanisol) $\text{CH}_3\text{CHCH}[\text{C}_6\text{H}_4\text{OCH}_3]$.

SOLUBILITY IN Aq. ALCOHOL AT 20° .

(Schimmel and Co. Reports, Oct 1895, p. 5)

| | | | | | |
|-------------------------------------|------|------|------|------|------|
| Vol. per cent alcohol = | 20 | 25 | 30 | 40 | 50 |
| Gm. Anethol per liter aq. alcohol = | 0.12 | 0.20 | 0.32 | 0.86 | 2.30 |

ANILIN $C_6H_5(NH_2)$.

SOLUBILITY IN WATER AT 22°.

(Herz — Ber. 31, 2671, '98; see also Vaubel — J. pr. Chem. [2] 52, 72, '95; Aignan and Dugas — Compt. rend. 129, 643, 99.)

100 cc. H_2O dissolve 3.481 cc. $C_6H_5(NH_2)$ — Vol. of Sol. = 103.48, Sp. Gr. = 0.9986.100 cc. $C_6H_5(NH_2)$ dissolve 5.22 cc. H_2O — Vol. of Sol. = 104.96, Sp. Gr. = 1.0175.

SOLUBILITY OF ANILIN IN WATER AT DIFFERENT TEMPERATURES.

(Alexejew — Ann. Physik. Chem. 28, 305, '86; calc. by Rothmund — Z. physik. Chem. 26, 475, '98.)

Determinations by "Synthetic Method" see Note, p. 9. Figures read from curve.

| t°. | Gms. $C_6H_5(NH_2)$ per 100 Grams. | | t°. | Gms. $C_6H_5NH_2$ per 100 Grams. | |
|-----|------------------------------------|---------------|---------------------|----------------------------------|---------------|
| | Aq. Layer. | Anilin Layer. | | Aq. Layer. | Anilin Layer. |
| 20 | 3.2 | 95.5 | 140 | 13.0 | 83.5 |
| 40 | 3.5 | 95.0 | 150 | 18.0 | 79.0 |
| 60 | 3.8 | 94.7 | 160 | 27.5 | 71.0 |
| 80 | 4.5 | 93.5 | 165 | 36.0 | 63.0 |
| 100 | 6.0 | 92.0 | 167.5 (crit. temp.) | 48.6 | |
| 120 | 8.5 | 88.5 | | | |

SOLUBILITY OF ANILIN IN AQUEOUS SALT SOLUTIONS AT 18°.

(Euler — Z. physik. Chem. 49, 307, '04.)

| Aq. Solution. | Gms. Salt per liter. | Gms. $C_6H_5(NH_2)$ per 100 g. solvent. | Aq. Solution. | Gms. Salt per liter. | Gms. $C_6H_5(NH_2)$ per 100 g. solvent. |
|---------------------|----------------------|---|---------------|----------------------|---|
| H_2O alone | 0 | 3.61 | N NaOH | 40.06 | 1.90 |
| $\frac{1}{2}$ N KCl | 37.3 | 3.15 | N LiCl | 42.48 | 2.80 |
| N KCl | 74.6 | 2.68 | N $CuCl_2$ | 67.25 | 3.00 |
| N NaCl | 58.5 | 2.55 | | | |

SOLUBILITY OF ANILIN IN AQUEOUS ANILIN HYDROCHLORIDE SOLUTIONS AT 18°.

(Lidow — J. russ. phys. chem. Ges. 15, 420, '83; Ber. 16, 2297, '83.)

| Per cent $C_6H_5NH_2HCl$ in Solvent. | Gms. $C_6H_5NH_2$ per 100 g. Solvent. | Per cent $C_6H_5NH_2HCl$ in Solvent. | Gms. $C_6H_5NH_2$ per 100 g. Solvent. |
|--------------------------------------|---------------------------------------|--------------------------------------|---------------------------------------|
| 5 | 3.8 | 30 | 39.2 |
| 12 | 5.3 | 35 | 50.4 |
| 25 | 18.3 | | |

DISTRIBUTION OF ANILIN BETWEEN:

(Vaubel — J. pr. Chem. [2] 67, 477, '03.)

| Water and Ether. | | | | Water and Carbon Tetra Chloride. | | | |
|---------------------------|-----------------|-----------------------|--------------|----------------------------------|-------------------|-----------------------|----------------|
| Composition of Solutions. | | Gms. $C_6H_5NH_2$ in: | | Composition of Solutions. | | Gms. $C_6H_5NH_2$ in: | |
| G. $C_6H_5NH_2$ Used. | Solvent. | Aq. Layer. | Ether Layer. | G. $C_6H_5NH_2$ Used. | Solvent. | Aq. Layer. | CCl_4 Layer. |
| 1.2478 | 50 cc. H_2O | | | | 50 cc. H_2O | | |
| | + 20 cc. Ether | 0.1671 | 1.0807 | 0.3478 | + 20 cc. CCl_4 | 0.3358 | 0.012 |
| 1.2478 | 50 cc. H_2O | | | | 50 cc. H_2O | | |
| | + 50 cc. Ether | 0.0835 | 1.1643 | 1.2478 | + 50 cc. CCl_4 | 0.2767 | 1.971 |
| 1.2478 | 50 cc. H_2O | | | | 50 cc. H_2O | | |
| | + 100 cc. Ether | 0.0594 | 1.1884 | 1.2478 | + 100 cc. CCl_4 | 0.1845 | 1.063 |

SOLUBILITY OF ANILIN IN SULPHUR.

(Alexejew — Ann. Physik. Chem. 28, 305, '86.)

| t°. | Gms. $C_6H_5NH_2$ per 100 g. | | t°. | Gms. $C_6H_5NH_2$ per 100 g. | |
|-----|------------------------------|---------------|-------------------|------------------------------|---------------|
| | S. Layer. | Anilin Layer. | | S. Layer. | Anilin Layer. |
| 100 | 4 | 75 | 130 | 15 | 58 |
| 110 | 6 | 70 | 135 | 17.5 | 47 |
| 120 | 10 | 64 | 138 (crit. temp.) | 23 | .. |

DISTRIBUTION OF ANILIN BETWEEN WATER AND TOLUENE AND
BETWEEN AQUEOUS SALT SOLUTIONS AND TOLUENE AT 25°.

(Riedel — Z. physik. Chem. 56, 243, '06.)

NOTE. — Mixtures of Anilin and Toluene were shaken with water or with aqueous salt solutions, and after separation of the two layers the Sp. Gr. of the A : T mixture (layer) was determined and also the amount of Anilin in each layer.

| Solution Shaken with A : T Mixture. | Vol. per cent Anilin : Toluene in Mixtures Used. | Sp. Gr. of A : T Mixture after Separation. | Gms. $C_6H_5NH_2$ in 100 cc. of: | |
|--|--|--|----------------------------------|------------|
| | | | A : T Layer. | Aq. Layer. |
| H ₂ O | 50:50 | 0.9257 | 41.5 | 2.14 |
| " | 25:75 | 0.8928 | 20.7 | 1.5 |
| " | 12.5:87.5 | 0.8737 | 8.62 | 0.86 |
| " | 5.5:94.5 | 0.8661 | 3.87 | 0.45 |
| " | 2.5:97.5 | 0.8627 | 1.68 | 0.21 |
| 0.1N $\frac{K_2SO_4}{2}$ | 50:50 | 0.9297 | 44.0 | 2.09 |
| " | 25:75 | 0.8901 | 19.03 | 1.38 |
| " | 12.5:87.5 | 0.8739 | 8.77 | 0.81 |
| " | 5.5:94.5 | 0.8663 | 3.94 | 0.42 |
| " | 2.5:97.5 | 0.8629 | 1.81 | 0.21 |
| 0.1N KBO_3 | 50:50 | 0.9257 | 41.61 | 2.11 |
| " | 25:75 | 0.8870 | 17.08 | 1.34 |
| " | 12.5:87.5 | 0.8748 | 9.34 | 0.92 |
| " | 5.5:94.5 | 0.8661 | 3.85 | 0.44 |
| " | 2.5:97.5 | 0.8627 | 1.72 | 0.21 |
| 0.01094N $\frac{Ba(OH)_2}{2}$ | 50:50 | 0.9334 | 46.52 | 2.10 |
| " | 25:75 | 0.8929 | 20.78 | 1.46 |
| " | 12.5:87.5 | 0.8749 | 9.41 | 0.88 |
| " | 5.5:94.5 | 0.8663 | 3.96 | 0.43 |
| " | 2.5:97.5 | 0.8628 | 1.72 | 0.20 |
| 0.104N $\frac{Sr(OH)_2}{2}$ | 50:50 | 0.9333 | 46.45 | 2.13 |
| " | 25:75 | 0.8929 | 20.78 | 1.46 |
| 0.1044N $\frac{Sr(OH)_2}{2}$ | 12.5:87.5 | 0.8750 | 9.46 | 0.88 |
| " | 5.5:94.5 | 0.8662 | 3.96 | 0.43 |
| 0.1063N $\frac{Sr(OH)_2}{2}$ | 2.5:97.5 | 0.8628 | 1.75 | 0.20 |
| 0.04N $\frac{Ca(OH)_2}{2}$ | 50:50 | 0.9333 | 46.18 | 2.20 |
| " | 25:75 | 0.8925 | 20.59 | 1.51 |
| " | 12.5:87.5 | 0.8749 | 9.43 | 0.91 |
| " | 5.5:94.5 | 0.8662 | 3.89 | 0.44 |
| " | 2.5:97.5 | 0.8627 | 1.70 | 0.21 |

100 cc. aqueous solution contain 3.607 gms. Anilin at 25°.

SOLUBILITY OF ANILIN, PHENOL MIXTURES IN WATER.

(Schreinemaker — Z. physik. Chem. 29, 584; 30, 460, '99.)

| t°. | Mixture used = 25.4 Mols. Anilin + 74.6 Mols. Phenol Gms. of Mixture per 100 Gms. | | t°. | Mixture used = 50 Mols. Anilin + 50 Mols. Phenol Gms. of Mixture per 100 Gms. | |
|-------------------|---|----------------|-------------------|---|----------------|
| | Aq. Layer. | A. + P. Layer. | | Aq. Layer. | A. + P. Layer. |
| 40 | 5.0 | 86.0 | 40 | 4.0 | 91.5 |
| 60 | 5.5 | 82.0 | 80 | 5.5 | 85.5 |
| 80 | 8.0 | 77.0 | 100 | 8.0 | 82.0 |
| 100 | 12.5 | 67.0 | 120 | 13.5 | 73.5 |
| 110 | 19.0 | 56.5 | 130 | 19.0 | 66.0 |
| 104 (crit. temp.) | 33 | ... | 135 | 23.5 | 58.0 |
| | | | 140 (crit. temp.) | 35 | ... |

Determinations in above table by "Synthetic Method," see Note, p. 9. Schreinemaker gives results for several other mixtures of Anilin and Phenol which yield curves entirely similar to those for the two mixtures here shown.

NitrANILINES $C_6H_4NH_2NO_2$, *o*, *m*, and *p*.

SOLUBILITY IN WATER.

(Carnelly and Thomson — J. Chem. Soc. 53, 768, '88; Vaubel — J. pr. Chem. [2] 52, 73, '95; above 20°, Löwenherz — Z. physik. Chem. 25, 407, '98.)

| t°. | Grams Nitranelin per Liter of Solution. | | |
|------|---|------------------|------------------|
| | Ortho Nitranelin. | Meta Nitranelin. | Para Nitranelin. |
| 20 | ... | 1.14-1.67 | 0.77-0.80 |
| 24.2 | 1.25 (25°) | 1.205 | ... |
| 27.3 | ... | 1.422 | ... |

SOLUBILITY OF ORTHO AND OF META NITRANILIN IN HYDROCHLORIC ACID.

(Löwenherz.)

Ortho Nitranelin at 25°.

| G. Mols. per Liter. | | Grams per Liter. | |
|---------------------|---------------------------|------------------|---------------------------|
| HCl | $C_6H_5NH_2$ $NO_2(o)$ | HCl | $C_6H_5NH_2$ $NO_2(o)$ |
| 0.0 | 0.0091 | 0.0 | 1.25 (25°) |
| 0.63 | 0.0143 | 22.97 | 1.97 (26.5°) |
| 0.95 | 0.0174 | 34.63 | 2.40 (23.3°) |
| 1.26 | 0.0215 | 45.94 | 2.97 |

Meta Nitranelin.

| G. Mols. per Liter. | | Grams per Liter. | |
|---------------------|---------------------------|------------------|---------------------------|
| HCl | $C_6H_5NH_2$ $NO_2(m)$ | HCl | $C_6H_5NH_2$ $NO_2(m)$ |
| 0.0 | 0.0091 | 0.0 | 1.20 |
| 0.0125 | 0.0183 | 0.46 | 2.53 |
| 0.0247 | 0.0274 | 0.90 | 3.85 |

SOLUBILITY OF META AND OF PARA NITRANILIN IN ORGANIC

SOLVENTS AT 20°.

(Carnelly and Thomson.)

| Solvent. | Gms. per Liter. | | Solvent. | Gms. per Liter. | |
|-------------------|-----------------|-------|-----------------------|-----------------|-------|
| | Meta. | Para. | | Meta. | Para. |
| Methyl Alcohol | 110.6 | 95.9 | Benzene | 24.5 | 19.8 |
| Ethyl Alcohol | 70.5 | 58.4 | Toluene | 17.1 | 13.1 |
| Propyl Alcohol | 56.5 | 43.5 | Cumene | 11.5 | 9.0 |
| Iso Butyl Alcohol | 26.4 | 19.1 | Chloroform | 30.1 | 23.1 |
| Iso Amyl Alcohol | 85.1 | 62.9 | Carbon Tetra Chloride | 2.1 | 1.7 |
| Ethyl Ether | 78.9 | 61.0 | Carbon Bisulphide | 3.3 | 2.6 |

ANIS ACID (*p*-Methoxybenzoic acid) $CH_3O.C_6H_4.COOH$.

100 cc. sat. aq. solution contain 0.2263 gm. Anis acid at 25°.

(Paul — Z. physik. Chem. 14, 111, '94.)

ANTHRACENE $C_{14}H_{10}$.**SOLUBILITY IN LIQUID SULPHUR DIOXIDE IN THE CRITICAL REGION.**

(Centnerswer and Teletow — Z. Electrochem. 9, 799, '03.)

Weighed amounts of anthracene and liquid SO_2 were placed in glass tubes which were then sealed, rotated at a gradually increasing temperature and the point at which the solid disappeared, observed.

| t°. | Gms. $C_{14}H_{10}$ per 100 g. Solution. | t°. | Gms. $C_{14}H_{10}$ per 100 g. Solution. | t°. | Gms. $C_{14}H_{10}$ per 100 g. Solution. |
|------|--|------|--|-------|--|
| 40.1 | 2.11 | 65.0 | 4.0 | 98.0 | 9.36 |
| 45.8 | 2.48 | 78.2 | 5.66 | 99.1 | 9.95 |
| 47.9 | 2.65 | 88.0 | 7.14 | 106.5 | 12.78 |

SOLUBILITY OF ANTHRACENE IN ABSOLUTE ETHYL AND METHYL ALCOHOLS.

(v. Becchi; at 19.5°, de Bruyn — Z. physik. Chem. 10, 784, '92.)

| | Grams $C_{14}H_{10}$ per 100 Grams Alcohol at: | | |
|-------------------|--|--------|--------|
| | 16°. | 19.5°. | b. pt. |
| In Ethyl Alcohol | 0.076 | 1.90 | 0.83 |
| In Methyl Alcohol | ... | 1.80 | ... |

SOLUBILITY OF ANTHRACENE IN BENZENE.

(Findlay — J. Chem. Soc. 82, 1221, '02.)

| t°. | Gms. $C_{14}H_{10}$ per 100 Gms. C_6H_6 . | Mols. $C_{14}H_{10}$ per 100 Mols. C_6H_6 . | t°. | Gms. $C_{14}H_{10}$ per 100 Gms. C_6H_6 . | Mols. $C_{14}H_{10}$ per 100 Mols. C_6H_6 . |
|------|---|---|------|---|---|
| 5 | 0.979 | 0.429 | 38.4 | 2.773 | 1.213 |
| 10 | 1.118 | 0.491 | 40.0 | 2.987 | 1.312 |
| 15 | 1.296 | 0.567 | 44.6 | 3.368 | 1.473 |
| 20 | 1.532 | 0.673 | 50 | 3.928 | 1.727 |
| 25 | 1.830 | 0.803 | 60 | 4.941 | 2.164 |
| 26.5 | 1.951 | 0.856 | 70 | 6.041 | 2.649 |
| 30 | 2.175 | 0.954 | 80 | 7.175 | 3.143 |

100 parts of toluene dissolve 0.92 parts anthracene at 16.5° and 12.94 parts at 100° (v. Becchi).

SOLUBILITY OF ANTHRACENE IN ALCOHOLIC PICRIC ACID SOLUTIONS AT 25°.

(Behrend — Z. physik. Chem. 15, 187, '94.)

| Grams per 100 Grams Solution. | | | Grams per 100 Gms. Solution. | | |
|----------------------------------|-------------|--------------------------------------|---------------------------------|-------------|-------------------------------------|
| Picric Acid. | Anthracene. | Solid Phase. | Picric Acid. | Anthracene. | Solid Phase. |
| 0 | 0.176 | Anthracene | 3.999 | 0.202 | Anthracene Picrate |
| 1.017 | 0.190 | " | 5.087 | 0.180 | " |
| 2.071 | 0.206 | " | 5.843 | 0.162 | " |
| 2.673 | 0.215 | " | 6.727 | 0.151 | " |
| 3.233 | 0.228 | " | 7.511 | 0.149 | Anthracene Picrate + Picric Acid |
| 3.469 | 0.236 | Anthracene and Anthracene Picrate | 7.452 | 0 | Picric Acid |

ANTHRAQUINONE

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ANTHRAQUINONE $(C_6H_4)_2(CO)_2$.**SOLUBILITY IN LIQUID SULPHUR DIOXIDE IN THE CRITICAL REGION.**

(Centnerswer and Teletow — Z. Electrochem. 9, 799, '08.) (See Anthracene, page 39.)

| t°. | Gms. $C_{14}H_{10}O_2$ per 100 g. Solution. | t°. | Gms. $C_{14}H_{10}O_2$ per 100 g. Solution. | t°. | Gms. $C_{14}H_{10}O_2$ per 100 g. Solution. |
|------|---|-------|---|-------|---|
| 39.6 | 0.64 | 92.1 | 2.81 | 118.5 | 5.60 |
| 51.5 | 0.88 | 101.4 | 3.67 | 141.6 | 7.53 |
| 67.9 | 1.73 | 106.3 | 4.23 | 160.0 | 9.60 |
| 82.4 | 2.24 | 108.7 | 4.40 | 179.0 | 12.70 |
| | | | | 183.7 | 18.30 |

100 parts of absolute ethyl alcohol dissolve 0.05 part anthraquinone at 18° and 2.249 parts at b. pt. (v. Becchi).

SOLUBILITY OF ANTHRAQUINONE IN ETHER.

(Smits — Z. Electrochem. 9, 663, '03.)

Weighed amounts of ether and anthraquinone were placed in glass tubes which were then sealed. The temperature noted at which the anthraquinone disappeared and also at which the liquid phase disappeared (critical temp.). The two curves cross at 195° and again at 241°. Between these two temperatures the critical curve lies below the solubility curve, hence for this range of temperature no solubility curve is shown. The following figures were read from the curves, and are therefore only approximately correct.

| t°. | Gms. $C_{14}H_{10}O_2$ per 100 g. Solution. | t°. | Gms. $C_{14}H_{10}O_2$ per 100 g. Solution. | t°. | Gms. $C_{14}H_{10}O_2$ per 100 g. Solution. |
|-----|---|-----|---|-----|---|
| 130 | 3 | 241 | 30 | 260 | 80 |
| 150 | 4 | 245 | 40 | 270 | 90 |
| 170 | 4.5 | 247 | 50 | 275 | 100 |
| 195 | 5.0 | 250 | 60 | | |

100 parts of toluene dissolve 0.19 part anthraquinone at 15° and 5.56 parts at 100° (v. Becchi).

ANTIMONY TRICHLORIDE $SbCl_3$.**SOLUBILITY IN WATER. SOLID PHASE** $SbCl_3$.

(Meerburg — Z. anorg. Chem. 33, 299, 1903.)

| t°. | Mols. $SbCl_3$ per 100 Mols. H_2O . | Gms. $SbCl_3$ per 100 g. H_2O . | t°. | Mols. $SbCl_3$ per 100 Mols. H_2O . | Gms. $SbCl_3$ per 100 g. H_2O . |
|-----|---|---|-----|---|---|
| 0 | 47.9 | 601.6 | 35 | 91.6 | 1152.0 |
| 15 | 64.9 | 815.8 | 40 | 108.8 | 1368.0 |
| 20 | { 72.4 | 910.1 | 50 | 152.5 | 1917.0 |
| | { 74.1 | 931.5 | 60 | 360.4 | 4531.0 |
| 25 | 78.6 | 988.1 | 72 | ∞ | ∞ |
| 30 | 84.9 | 1068.0 | | | |

41 ANTIMONY TRICHLORIDE

SOLUBILITY OF ANTIMONY TRICHLORIDE IN AQUEOUS HYDROCHLORIC ACID. SOLID PHASE SbCl_3 . TEMP. 20° .
(Meerburg.)

| Mols. per 100 Mols. H_2O . | | Gms. per 100 g. H_2O . | | Mols. per 100 Mols. H_2O . | | Gms. per 100 g. H_2O . | |
|---|-------------------|---|-------------------|---|-------------------|---|-------------------|
| HCl. | SbCl_3 . | HCl. | SbCl_3 . | HCl. | SbCl_3 . | HCl. | SbCl_3 . |
| 0 | 72.4 | 0.0 | 910.1 | 9.1 | 68.9 | 18.41 | 866.4 |
| 2.4 | 71.2 | 4.86 | 895.4 | 11.7 | 68.1 | 23.68 | 856.3 |
| 6.1 | 69.9 | 12.34 | 879.0 | 28.7 | 62.8 | 58.08 | 789.8 |
| 8.3 | 68.2 | 16.80 | 857.6 | | | | |

100 grams absolute acetone dissolve 537.6 grams SbCl_3 at 18° .
(Naumann — Ber. 37, 4332, '04.)

ANTIMONY TRI IODIDE SbI_3 .

SOLUBILITY IN METHYLENE IODIDE AT 12° .
(Retgers — Z. anorg. Ch. 3, 344, '93.)

100 parts CH_2I_2 dissolve 11.3 parts SbI_3 . Sp. Gr. of solution = 3.453.

ANTIMONY POTASSIUM TARTRATE $\text{K}(\text{SbO})\text{C}_4\text{H}_4\text{O}_6 \cdot \frac{1}{2}\text{H}_2\text{O}$.

100 grams glycerine dissolve 5.5 grams of the tartrate at 15.5° .

ARGON, A.

SOLUBILITY IN WATER.

(Estreicher — Z. physik. Chem. 31, 184, '99.)

| t°. | Cor. Bar. Pressure. | Vol. H_2O . | Vol. Absorbed Argon. | Absorption Coefficients.* | | Solubility. g. |
|-----|------------------------|--------------------------------|-------------------------|---------------------------|--------|-------------------|
| | | | | a. | l. | |
| 0 | ... | ... | ... | ... | 0.0578 | 0.0102 |
| 1 | 764.9 | 77.40 | 4.34 | 0.0561 | 0.0561 | 0.0099 |
| 5 | 765.0 | 77.39 | 3.92 | 0.0507 | 0.0508 | 0.0090 |
| 10 | 765.3 | 77.41 | 3.49 | 0.0450 | 0.0453 | 0.0079 |
| 15 | 762.4 | 77.46 | 3.13 | 0.0404 | 0.0410 | 0.0072 |
| 20 | 757.6 | 77.53 | 2.86 | 0.0369 | 0.0379 | 0.0066 |
| 25 | 766.7 | 77.62 | 2.64 | 0.0339 | 0.0347 | 0.0060 |
| 30 | 760.6 | 77.73 | 2.43 | 0.0312 | 0.0326 | 0.0056 |
| 35 | 757.1 | 77.86 | 2.24 | 0.0288 | 0.0305 | 0.0052 |
| 40 | 758.3 | 77.99 | 2.07 | 0.0265 | 0.0286 | 0.0048 |
| 45 | 756.4 | 78.15 | 1.92 | 0.0246 | 0.0273 | 0.0045 |
| 50 | 747.6 | 78.31 | 1.73 | 0.0221 | 0.0257 | 0.0041 |

a — under barometric pressure minus tension of H_2O vapor.

l — under 760 mm. pressure.

g — grams argon per 100 g. H_2O when total pressure is equal to 760 mm.

* See Acetylene, page 8.

ARSENIO PENTOXIDE As_2O_5 .

100 parts H_2O dissolve 244.8 parts As_2O_5 = 302.3 parts H_3AsO_4 at 12.5° . Sp. Gr. of solution = 2.18 at 15° .

(Vogel.)

ARSENIO IODIDE AsI_3 .

SOLUBILITY IN METHYLENE IODIDE AT 12° .

(Retgers — Z. anorg. Chem. 3, 344, 1893.)

100 grams CH_2I_2 dissolve 17.4 gms. AsI_3 . Sp. Gr. of solution = 3.449.

ARSENIC TRIOXIDE

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ARSENIC TRIOXIDE As_2O_3 .

SOLUBILITY OF THE:

Crystallized Modification.

In Water.

| t°. | Gms. As_2O_3 per 100 cc. Sat. Solution. |
|--------|---|
| 2 | 1.201 |
| 15 | 1.657 |
| 25 | 2.038 |
| 39.8 | 2.930 |
| b. pt. | 6. + |

(Bruner and St. Tolloczko — Z. anorg. Chem. 37, 456, '03; Chodounsky — Latsy. Chem. 13, 114, '88.)

Amorphous Modification.

In Water.

| t°. | Gms. As_2O_3 per 100 cc. H_2O . |
|---------------------------------------|--|
| ord. temp. | 3.7 |
| b. pt. | 11.86 |
| In Alcohol, Ether and CS_2 . | |
| | G. As_2O_3 per 100 g. Solvent. |
| Alcohol | 0.446 |
| Ether | 0.454 |
| CS_2 | 0.001 |

(Winkler — J. pr. Chem. [2] 31, 347, '85.)

ASPARAGINE $\text{C}_4\text{H}_8\text{N}_2\text{O}_3 \cdot \text{H}_2\text{O}$.SOLUBILITY β -l-ASPARAGINE $\text{C}_4\text{H}_8\text{N}_2\text{O}_3 \cdot \text{H}_2\text{O}$ AND OF β -l-ASPARAGINIC ACID $\text{C}_4\text{H}_7\text{NO}_4$ IN WATER.

Determined by "Synthetic Method," see Note, page 9.

(Bresler — Z. physik. Chem. 47, 613, '04.)

| β -l-Asparagine. | | | | β -l-Asparaginic Acid. | | | |
|------------------------|--|------|--|------------------------------|--|------|--|
| t°. | Gms. $\text{C}_4\text{H}_8\text{N}_2\text{O}_3 \cdot \text{H}_2\text{O}$ per 100 g. H_2O . | t°. | Gms. $\text{C}_4\text{H}_8\text{N}_2\text{O}_3 \cdot \text{H}_2\text{O}$ per 100 g. H_2O . | t°. | Gms. $\text{C}_4\text{H}_7\text{NO}_4$ per 100 g. H_2O . | t°. | Gms. $\text{C}_4\text{H}_7\text{NO}_4$ per 100 g. H_2O . |
| 0.7 | 0.9546 | 55.5 | 10.650 | 0.2 | 0.2674 | 51.0 | 1.2746 |
| 7.9 | 1.4260 | 71.7 | 19.838 | 9.5 | 0.4042 | 63.5 | 1.8147 |
| 17.5 | 2.1400 | 87.0 | 36.564 | 16.4 | 0.5176 | 70.0 | 2.3500 |
| 28.0 | 3.1710 | 98.0 | 52.475 | 31.5 | 0.7514 | 80.5 | 3.2106 |
| 41.4 | 5.6500 | | | 40.0 | 0.9258 | 97.4 | 5.3746 |

ATROPINE $\text{C}_{17}\text{H}_{23}\text{NO}_3$.SOLUBILITY OF ATROPINE $\text{C}_{17}\text{H}_{23}\text{NO}_3$ AND OF ATROPINE SULPHATE $\text{C}_{17}\text{H}_{23}(\text{NO}_3)_2 \cdot \text{SO}_2(\text{OH})_2$ IN WATER AND OTHER SOLVENTS.

(U. S. P.; Müller — Apoth. Ztg. 18, 244, '03.)

| Solvent. | t°. | Grams Atropine per 100 Grams. | | Grams Atropine Sulphate per 100 Grams Solvent. (U. S. P.) |
|----------------------|-----|-------------------------------|---------------------|---|
| | | Solution. | Solvent. (U. S. P.) | |
| Water | 25 | 1.782 (20°) | 0.222 | 263.1 |
| Water | 80 | ... | 1.15 | 454.5 |
| Alcohol | 25 | ... | 68.44 | 27.0 |
| Alcohol | 60 | ... | 111.11 | 52.6 |
| Ether | 25 | 2.21 (20°) | 6.02 | 0.047 |
| Chloroform | 25 | 68.03 (20°) | 64.10 | 0.161 |
| Benzene | 20 | 3.99 | ... | ... |
| Carbon Tetrachloride | 20 | 0.661 | 1.136* (17°) | ... |
| Ethyl Acetate | 20 | 3.88 | ... | ... |
| Petroleum Ether | 20 | 0.83 | ... | ... |
| Glycerine | 15 | ... | 3.0 | 33.0 |

* Schnidelmeyer — Chem. Ztg. 25, 129, '01.

AZELAIC ACID $C_7H_{14}(COOH)_2$.

SOLUBILITY IN WATER.

(Lamoureux — Compt. rend. 128, 998, '99.)

| | | | | | | |
|--|------|------|------|------|------|------|
| $t^\circ =$ | 0 | 15 | 20 | 35 | 50 | 65 |
| Gms. $C_7H_{14}(COOH)_2$ per 100 cc. solution = | 0.10 | 0.15 | 0.24 | 0.45 | 0.82 | 2.20 |

AZOPHENETOL (*p*) $C_6H_5N_2.C_6H_4.OC_2H_5$.

SOLUBILITY IN 100 PER CENT ACETIC ACID.

(Dreyer and Rotarski — Chem. Centr. 76, II, 1016, '05.)

| | | | | | | |
|------------------|-------|-------|-------|-------|-------|-------|
| $t^\circ =$ | 89.2 | 91 | 93 | 95.6 | 97.2 | 99.6 |
| Mols. per liter. | 0.153 | 0.176 | 0.185 | 0.209 | 0.232 | 0.252 |

A knick at 94.7° corresponds to the transition temperature of the α modification into the β modification.

BARIUM ACETATE $Ba(CH_3COO)_2$.

SOLUBILITY IN WATER.

(Walker and Fyffe — J. Ch. Soc. 83, 179, '03; Krasnicki — Monatsh. Chem. 8, 597, '87.)

| t° . | Gms. $Ba(CH_3COO)_2$ per 100 Gms. Water. Solution. | | Solid Phase. | t° . | Gms. $Ba(CH_3COO)_2$ per 100 Gms. Water. Solution. | | Solid Phase. |
|-------------|--|------|-------------------------------|-------------|--|------|-------------------|
| 0.3 | 58.8 | 37.0 | $Ba(C_2H_3O_2)_2 \cdot 3H_2O$ | 40.5 | 79.0 | 44.1 | $Ba(C_2H_3O_2)_2$ |
| 7.9 | 61.6 | 38.1 | " | 41.5 | 78.7 | 44.0 | " |
| 17.5 | 69.2 | 40.9 | " | 44.5 | 77.9 | 43.8 | " |
| 21.6 | 72.8 | 42.1 | " | 51.8 | 76.5 | 43.4 | " |
| 24.1 | 78.1 | 43.9 | " | 63.0 | 74.6 | 42.7 | " |
| 26.2 | 76.4 | 43.3 | $Ba(C_2H_3O_2)_2 \cdot H_2O$ | 73.0 | 73.5 | 42.4 | " |
| 30.6 | 75.1 | 42.9 | " | 84.0 | 74.0 | 42.5 | " |
| 35.0 | 75.8 | 43.1 | " | 99.2 | 74.8 | 42.8 | " |
| 39.6 | 77.9 | 43.8 | " | | | | |

Transition temperatures 24.7° and 41° .

BARIUM ARSENATE $Ba_3(AsO_4)_2$.

100 gms. H_2O dissolve 0.055 gm. $Ba_3(AsO_4)_2$; 100 gms. 5% NH_4Cl dissolve 0.195 gm., and 100 gms. 10% NH_4OH dissolve 0.003 gm. $Ba_3(AsO_4)_2$.

(Field — J. Ch. Soc. 11 6, 1859.)

BARIUM BROMATE

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BARIUM BROMATE $\text{BaBrO}_3 \cdot \text{H}_2\text{O}$.

SOLUBILITY IN WATER.

(Trants and Anschütz — Z. physik. Chem. 56, 238, '06; Rammelsberg — Pogg. Ann. 52, 81, '41.)

| t°. | Gms. $\text{Ba}(\text{BrO}_3)_2$ per 100 Gms. Solution. | t°. | Gms. $\text{Ba}(\text{BrO}_3)_2$ per 100 Gms. Solution. | t°. | Gms. $\text{Ba}(\text{BrO}_3)_2$ per 100 Gms. Solution. |
|---------|---|-----|---|-------|---|
| — 0.034 | 0.28 | 30 | 0.95 | 70 | 2.922 |
| 0 | 0.286 | 40 | 1.31 | 80 | 3.521 |
| +10 | 0.439 | 50 | 1.72 | 90 | 4.26 |
| 20 | 0.652 | 60 | 2.271 | 98.7 | 5.256 |
| 25 | 0.788 | | | 99.65 | 5.39 |

BARIUM BROMIDE $\text{BaBr}_2 \cdot 2\text{H}_2\text{O}$.

SOLUBILITY IN WATER.

(Kremers — Pogg. Ann. 99, 47, '56; Etard — Ann. chim. phys. [7] 2, 540, '94.)

| t°. | Gms. BaBr_2 per 100 Grams. | | | t°. | Gms. BaBr_2 per 100 Grams. | | |
|------|-------------------------------------|-------------------------|----------|-----|-------------------------------------|-------------------------|----------|
| | Water. (Kremers.) | Solution. (Kremers.) | (Etard.) | | Water. (Kremers.) | Solution. (Kremers.) | (Etard.) |
| — 20 | ... | ... | 45.6 | 40 | 114 | 53.2 | 51.5 |
| 0 | 98 | 49.5 | 47.5 | 50 | 118 | 54.1 | 52.5 |
| 10 | 101 | 50.2 | 48.5 | 60 | 123 | 55.1 | 53.5 |
| 20 | 104 | 51.0 | 49.5 | 70 | 128 | 56.1 | 54.5 |
| 25 | 106 | 51.4 | 50.0 | 80 | 135 | 57.4 | 55.5 |
| 30 | 109 | 52.1 | 50.6 | 100 | 149 | 60.0 | 57.8 |
| | | | | 140 | ... | ... | 59.4 |

Sp. Gr. of saturated solution at 19.5° = 1.710.

The results of Kremers and Etard are both given, since it is uncertain which is the more correct.

SOLUBILITY OF MIXTURES OF BARIUM BROMIDE AND BARIUM IODIDE IN WATER AT DIFFERENT TEMPERATURES.

(Etard.)

| t°. | Grams per 100 Gms. Solution. | | t°. | Grams per 100 Gms. Solution. | |
|------|------------------------------|------------------|------------------------------------|------------------------------|------------------|
| | BaBr_2 . | BaI_2 . | | BaBr_2 . | BaI_2 . |
| — 16 | 4.8 | 58.4 | 170 | 11.0 | 67.4 |
| +60 | 5.5 | 66.0 | 210 | 14.9 | 67.7 |
| 135 | 9.2 | 67.2 | Both salts present in solid phase. | | |

SOLUBILITY OF BARIUM BROMIDE IN METHYL AND ETHYL ALCOHOLS.

(de Bruyn — Z. physik. Chem. 10, 783, 92; Richards — Z. anorg. Chem. 3, 455, '93; Rohland — *Ibid.* 15, 412, '97.)

| t°. | Parts BaBr_2 per 100 parts Aq. $\text{C}_2\text{H}_5\text{OH}$ of: | | | t°. | Parts $\text{BaBr}_2 \cdot 2\text{H}_2\text{O}$ per 100 parts of Aq. CH_3OH of: | | |
|------|---|--|------|------|---|--------|------|
| | 100%. | 97%. | 87%. | | 100%. | 93.5%. | 50%. |
| 15.0 | .. | 0.48 ($\text{BaBr}_2 \cdot 2\text{H}_2\text{O}$) | .. | 45.9 | 36.44 | 27.3 | 4.0 |
| 22.5 | 3 | ... | 6 | 56.1 | ... | ... | ... |

BARIUM BUTYRATE $\text{Ba}(\text{C}_4\text{H}_7\text{O}_2)_2 \cdot 2\text{H}_2\text{O}$.

SOLUBILITY IN WATER.

(Deszathy — Monatsh. Chem. 14, 249, '93.)

| t°. | Gms. $\text{Ba}(\text{C}_4\text{H}_7\text{O}_2)_2$ per 100 Gms. | | t°. | Gms. $\text{Ba}(\text{C}_4\text{H}_7\text{O}_2)_2$ per 100 Gms. | |
|-----|---|-----------|-----|---|-----------|
| | Water. | Solution. | | Water. | Solution. |
| 0 | 37.42 | 27.24 | 50 | 36.44 | 26.77 |
| 10 | 36.65 | 26.82 | 60 | 37.68 | 27.36 |
| 20 | 36.12 | 26.55 | 70 | 39.58 | 28.36 |
| 30 | 35.85 | 26.38 | 80 | 42.13 | 29.64 |
| 40 | 35.82 | 26.37 | | | |

BARIUM CAPROATE AND BARIUM ISO CAPROATE.

SOLUBILITY IN WATER.

(Kulisch — Monatsh. Chem. 14, 567, '93.)

(König — Monatsh. Chem. 15, 23, '94.)

| Barium Caproate (Methyl 3 Pentan.) $\text{Ba}(\text{CH}_2\text{CH}_2\text{CH}(\text{CH}_3)\text{CH}_2\text{COO})_2$ | | | | Barium Iso Caproate (Methyl 2 Pentan.) $\text{Ba}(\text{CH}_2\text{CH}(\text{CH}_3)\text{CH}_2\text{CH}_2\text{COO})_2$ | | | |
|--|---|-----------|---|--|---|-----------|--|
| t°. | Gms. $\text{Ba}(\text{C}_6\text{H}_{11}\text{O}_2)_2$ per 100 Gms. | | Solid Phase. | | Gms. $\text{Ba}(\text{C}_6\text{H}_{11}\text{O}_2)_2$ per 100 Gms. | | Solid Phase. |
| | Water. | Solution. | | | Water. | Solution. | |
| 0 | 11.71 | 10.49 | $\text{Ba}(\text{C}_6\text{H}_{11}\text{O}_2)_2 \cdot 3\frac{1}{2}\text{H}_2\text{O}$ | | 14.34 | 12.54 | $\text{Ba}(\text{C}_6\text{H}_{11}\text{O}_2)_2 \cdot 4\text{H}_2\text{O}$ |
| 10 | 8.38 | 7.73 | " | | 13.33 | 11.77 | " |
| 20 | 6.89 | 6.45 | " | | 12.67 | 11.26 | " |
| 30 | 5.87 | 5.55 | " | | 12.37 | 11.01 | " |
| 40 | 5.79 | 5.47 | " | | 12.42 | 11.05 | " |
| 50 | 6.63 | 6.21 | " | | 12.83 | 11.38 | " |
| 60 | 8.39 | 7.74 | " | | 13.63 | 11.99 | " |
| 70 | 11.09 | 9.98 | " | | 14.68 | 12.80 | " |
| 80 | 14.71 | 12.82 | " | | 16.24 | 13.97 | " |
| 90 | 19.28 | 16.16 | " | | 17.95 | 15.23 | " |

BARIUM CARBONATE BaCO_3 .

SOLUBILITY IN WATER.

(Holleman, Kohlrausch and Rose — Z. physik. Chem. 12, 129, 241, '93.)

Electrolytic conductivity method used.

1 liter H_2O dissolves 0.016 g. BaCO_3 at 8.8° , 0.022 g. at 18° , and 0.024 g. at 24.2° .SOLUBILITY OF BARIUM CARBONATE IN WATER CONTAINING CO_2 .

The average of several determinations at about 10° , by Bineau, Lassaigne, Foucroy and Bergmann is 1.10 gms. BaCO_3 per liter water. Wagner (Z. anal. Ch. 6, 167, '67) gives 7.25 gms. BaCO_3 per liter of water saturated with CO_2 at 4-6 atmospheres pressure.

BARIUM CHLORATE $\text{BaClO}_3 \cdot \text{H}_2\text{O}$.

SOLUBILITY IN WATER.

(Trantz and Anschütz — Z. physik. Chem. 56, 238, '06; Kremers — Pogg. Ann. 99, 43, '56; Tilden and Shenstone — Trans. Roy. Soc. 34, '84.)

| t°. | Gms. $\text{Ba}(\text{ClO}_3)_2$ per 100 Gms. Solution. | t°. | Gms. $\text{Ba}(\text{ClO}_3)_2$ per 100 Gms. Solution. | t°. | Gms. $\text{Ba}(\text{ClO}_3)_2$ per 100 Gms. Solution. |
|--------|---|-----|---|------|---|
| - 2.75 | 15.28 | 30 | 29.43 | 90 | 48.70 |
| 0 | 16.90 | 40 | 33.16 | 99.1 | 51.17 |
| + 10 | 21.23 | 50 | 36.69 | 105 | 52.62 |
| 20 | 25.26 | 60 | 40.05 | 116 | 66.0 |
| 25 | 27.53 | 70 | 43.04 | 146 | 78.0 |
| | | 80 | 45.90 | | |

BARIUM CHLORIDE

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BARIUM CHLORIDE $\text{BaCl}_2 \cdot 2\text{H}_2\text{O}$.

SOLUBILITY IN WATER.

(Mulder; Engel — Ann. chim. phys. [6] 13, 372, '88; Etard — *Ibid.* [7] 2, 535, '94.)

| t°. | Gms. BaCl_2 per 100 Gms. | | t°. | Gms. BaCl_2 per 100 Gms. | |
|-----|-----------------------------------|-----------|-----|-----------------------------------|-----------|
| | Water. | Solution. | | Water. | Solution. |
| 0 | 31.6 | 24.0 | 60 | 46.4 | 31.3 |
| 10 | 33.3 | 25.0 | 70 | 49.4 | 33.1 |
| 20 | 35.7 | 26.3 | 80 | 52.4 | 34.4 |
| 25 | 37.0 | 27.0 | 100 | 58.8 | 37.0 |
| 30 | 38.2 | 27.7 | 130 | 59.5 | 37.3 |
| 40 | 40.7 | 28.9 | 160 | 63.6 | 38.9 |
| 50 | 43.6 | 30.4 | 215 | 75.9 | 43.1 |

Sp. Gr. of solution saturated at 0° = 1.25; at 20° = 1.27.

SOLUBILITY OF MIXTURES OF BARIUM CHLORIDE AND BARIUM NITRATE IN WATER.

Both salts present in solid phase.

(Etard.)

| t°. | Grams per 100 Gms. Solution. | | t°. | Grams per 100 Gms. Solution. | |
|-----|------------------------------|------------------------------|-----|------------------------------|------------------------------|
| | BaCl_2 . | $\text{Ba}(\text{NO}_3)_2$. | | BaCl_2 . | $\text{Ba}(\text{NO}_3)_2$. |
| 0 | 22.5 | 4.3 | 100 | 31 | 14 |
| 20 | 24.5 | 6.0 | 140 | 32 | 20 |
| 40 | 26.5 | 7.5 | 180 | 33 | 26 |
| 60 | 28.5 | 9.5 | 210 | 32 | 32 |

SOLUBILITY OF MIXTURES OF BARIUM CHLORIDE AND MERCURIC CHLORIDE IN WATER.

(Foote and Bristol — Am. Ch. J. 32, 248, '04.)

| t°. | Gms. per 100 Gms. Solution. | | Solid Phase. | t°. | Gms. per 100 Gms. Solution. | | Solid Phase. |
|------|-----------------------------|-------------------|--|------|-----------------------------|-------------------|--|
| | BaCl_2 . | HgCl_2 . | | | BaCl_2 . | HgCl_2 . | |
| 10.4 | 23.58 | 50.54 | $\text{BaCl}_2 \cdot 2\text{H}_2\text{O} + \text{HgCl}_2$. | 10.4 | 22.10 | 51.66 | Double Salt $\text{BaCl}_2 \cdot 3\text{HgCl}_2 \cdot 6\text{H}_2\text{O}$. |
| 10.4 | 23.44 | 50.74 | Double Salt $\text{BaCl}_2 \cdot 3\text{HgCl}_2 \cdot 6\text{H}_2\text{O}$. | 10.4 | 21.64 | 51.74 | Double Salt $\text{BaCl}_2 \cdot 2\text{H}_2\text{O} + \text{HgCl}_2$. |
| 10.4 | 22.58 | 51.23 | | 25 | 23.02 | 54.83 | |
| 10.4 | 22.48 | 51.41 | | | | | |

SOLUBILITY OF MIXTURES OF BARIUM CHLORIDE AND POTASSIUM CHLORIDE IN WATER.

(Foote — Am. Ch. J. 32, 253, '04.)

100 grams saturated solution contain 13.83 grams BaCl_2 + 18.97 grams KCl at 25°.

SOLUBILITY OF MIXTURES OF BARIUM CHLORIDE AND SODIUM CHLORIDE IN WATER.

(Precht and Wittgen — Ber. 14, 1667, '81; Rüdorff — Ber. 18, 1161, '85.)

| t°. | Gms. per 100 Gms. H_2O . | | Gms. per 100 Gms. Solution. | |
|-----|--|-----------------|-----------------------------|------|
| | BaCl_2 . | NaCl . | | |
| 20 | 4.1 | 33.8 | 2.9 | 25.0 |
| 40 | 6.3 | 33.6 | 4.5 | 23.0 |
| 60 | 9.7 | 33.5 | 6.8 | 23.4 |
| 80 | 13.9 | 33.6 | 9.4 | 22.8 |
| 100 | 17.9 | 33.6 | 11.8 | 22.2 |

SOLUBILITY OF BARIUM CHLORIDE IN AQUEOUS SOLUTIONS OF HYDROCHLORIC ACID AT 0°.

(Engel — Ann. chim. phys. [6] 13, 371, '88.)

| Sp. Gr. of Solutions. | Milligram Mols. per 10 cc. Sol. | | Gms. per 100 cc. Sol. | | Gms. per 100 g. Sol. | |
|-----------------------|---------------------------------|-----------------------------------|-----------------------|---------------------|----------------------|---------------------|
| | HCl. | $\frac{1}{2}$ BaCl ₂ . | HCl. | BaCl ₂ . | HCl. | BaCl ₂ . |
| 1.250 | 0 | 28.90 | 0 | 30.10 | 0 | 24.07 |
| 1.242 | 1.1 | 27.80 | 0.40 | 28.95 | 0.32 | 23.31 |
| 1.228 | 2.8 | 26.07 | 1.02 | 27.15 | 0.83 | 22.11 |
| 1.210 | 5.0 | 23.40 | 1.82 | 24.36 | 1.51 | 20.14 |
| 1.143 | 14.4 | 14.00 | 5.24 | 14.57 | 4.58 | 12.76 |
| 1.118 | 18.8 | 10.20 | 6.84 | 10.47 | 6.13 | 9.37 |
| 1.099 | 22.7 | 6.67 | 8.99 | 6.95 | 7.55 | 6.33 |
| 1.079 | 32.0 | 2.74 | 11.66 | 2.85 | 10.81 | 2.64 |
| 1.088 | 50.5 | 0.29 | 18.41 | 0.30 | 16.92 | 0.28. |

Less than 1 part of BaCl₂ is soluble in 20,000 parts of concentrated HCl and in 120,000 parts of conc. HCl containing $\frac{1}{2}$ volume of ether.

(Mar — Am. J. Sci. [3] 43, 521, '92.)

SOLUBILITY OF BARIUM CHLORIDE IN ABSOLUTE METHYL ALCOHOL AND IN GLYCERINE.

(In Alcohol, de Bruyn — Z. physik. Chem. 10, 783, '92.)

100 parts of CH₃OH dissolve 2.18 parts BaCl₂ at 15.5°, and 7.3 parts BaCl₂.2H₂O at 6°.

100 parts by weight of glycerine dissolve 10 parts of BaCl₂ at 15.5°.

SOLUBILITY OF BARIUM CHLORIDE IN AQUEOUS ETHYL ALCOHOL AT 15°.

(Schiff — Liebig's Ann. 118, 365, '61; Rohland — Z. anorg. Ch. 15, 412, '97.)

| | | | | | | | |
|--|------|------|------|------|-----|-----|-------|
| Wt. per cent alcohol | 10 | 20 | 30 | 40 | 60 | 80 | 97 |
| Gms. BaCl ₂ .2H ₂ O per 100 g. aq. alcohol | 31.1 | 21.9 | 14.7 | 10.2 | 3.5 | 0.5 | 0.014 |

BARIUM CHROMATE BaCrO₄.

SOLUBILITY IN WATER AND IN SALT SOLUTIONS.

| t°. | Solvent. | Gms. BaCrO ₄ per Liter Solution. | Observer. |
|------------|------------------|---|---|
| 18 | Water | 0.0038 | { Kohlrausch & Rose — Z. physik. Ch. 12, 241, '93.) |
| ord. temp. | " | 0.0062 (ignited BaCrO ₄) | { (Schweitzer — Z. anal. Ch. 29, 414, '90.) |
| ord. temp. | " | 0.0100 (not ignited) | { (Mescherzski — Z. anal. Ch. 21, 399, '82.) |
| b. pt. | " | 0.043 | { (Fresenius — Z. anal. Ch. 29, 418, '90.) |
| ord. temp. | 1.5% Am. Acetate | 0.020 | |
| ord. temp. | 0.5% Am. Nitrate | 0.022 | |

BARIUM CITRATE Ba₃(C₆H₅O₇)₂.7H₂O.

SOLUBILITY IN WATER AND IN ALCOHOL.

100 grams water dissolve 0.0406 gram Ba₃(C₆H₅O₇)₂.7H₂O at 18°, and 0.0572 gm. at 25°.

100 grams 95% alcohol dissolve 0.0044 gram Ba₃(C₆H₅O₇)₂.7H₂O at 18°, and 0.0058 gm. at 25°.

(Partheil and Hübner — Archiv. Pharm. 241, 413, '03.)

BARIUM CYANIDE

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BARIUM CYANIDE $\text{Ba}(\text{CN})_2$.SOLUBILITY IN WATER AND IN ALCOHOL AT 14° .

(Joannis — Ann. chim. phys. [5] 26, 489, '82.)

100 parts water dissolve 80 parts $\text{Ba}(\text{CN})_2$.100 parts 70% alcohol dissolve 18 parts $\text{Ba}(\text{CN})_2$.**BARIUM FERROCYANIDE AND BARIUM POTASSIUM FERROCYANIDE.**

(Wyruboff — Ann. chim. phys. [4] 16, 292, '69.)

100 parts water dissolve 0.1 part $\text{Ba}_2\text{Fe}(\text{CN})_6 \cdot 6\text{H}_2\text{O}$ at 15° , and 1.0 part at 75° .100 parts water dissolve 0.33 part $\text{BaK}_2\text{Fe}(\text{CN})_6 \cdot 5\text{H}_2\text{O}$ at ord. temp.**BARIUM FLUORIDE** BaF_2 .

(Kohlrausch — Z. physik. Chem. 59, 365, '04-'05.)

1 liter of water dissolves 1.63 gms. BaF_2 at 18° . Electrolytic conductivity method.**BARIUM FORMATE** $\text{Ba}(\text{HCOO})_2 \cdot 2\text{H}_2\text{O}$.

SOLUBILITY IN WATER.

(Kramicki — Monatsch. Chem. 8, 597, '87.)

| t°. | Gms. $\text{Ba}(\text{HCOO})_2$ per 100 Gms. | | t°. | Gms. $\text{Ba}(\text{HCOO})_2$ per 100 Gms. | |
|-----|--|-----------|-----|--|-----------|
| | Water. | Solution. | | Water. | Solution. |
| 0 | 27.76 | 21.72 | 40 | 34.81 | 25.82 |
| 10 | 28.46 | 21.15 | 50 | 37.14 | 27.10 |
| 20 | 30.11 | 23.15 | 60 | 38.97 | 28.03 |
| 25 | 31.20 | 23.80 | 70 | 39.95 | 28.54 |
| 30 | 32.34 | 24.45 | 80 | 39.71 | 28.42 |

BARIUM HYDROXIDE $\text{Ba}(\text{OH})_2$.SOLUBILITY IN WATER. SOLID PHASE $\text{Ba}(\text{OH})_2 \cdot 8\text{H}_2\text{O}$.

(Rosenthal and Rühlmann — Jahresber. Chem. 314, '70.)

| t°. | Gms. $\text{Ba}(\text{OH})_2$ per 100 Gms. | | t°. | Gms. $\text{Ba}(\text{OH})_2$ per 100 Gms. | |
|-----|--|-----------|-----|--|-----------|
| | Water. | Solution. | | Water. | Solution. |
| 0 | 1.67 | 1.65 | 30 | 5.59 | 5.29 |
| 5 | 1.95 | 1.92 | 40 | 8.22 | 7.60 |
| 10 | 2.48 | 2.42 | 50 | 13.12 | 11.61 |
| 15 | 3.23 | 3.13 | 60 | 20.94 | 17.32 |
| 20 | 3.89 | 3.74 | 75 | 63.51 | 38.85 |
| 25 | 4.68 | 4.47 | 80 | 101.40 | 50.35 |

SOLUBILITY OF BARIUM HYDROXIDE IN AQUEOUS ACETONE AT 25° .

(Herz and Knoch — Z. anorg. Chem. 41, 321, '04.)

| Sp. Gr. of Solutions. | Vol. % Acetone. | Ba(OH) ₂ per 100 cc. Sat. Solution. | | Gms. Ba(OH) ₂ per 100 Gms. Solution. |
|-----------------------|-----------------|--|--------|---|
| | | Millimols. | Grams. | |
| 1.0479 | 0 | 55.08 | 4.722 | 4.506 |
| 1.0168 | 10 | 31.84 | 2.730 | 2.686 |
| 0.9927 | 20 | 17.79 | 1.525 | 1.536 |
| 0.9763 | 30 | 9.10 | 0.779 | 0.798 |
| 0.9561 | 40 | 4.75 | 0.407 | 0.426 |
| 0.9398 | 50 | 1.54 | 0.132 | 0.141 |
| 0.9179 | 60 | 0.48 | 0.041 | 0.045 |
| 0.8956 | 70 | 0.08 | 0.007 | 0.018 |

BARIUM IODATE $\text{Ba}(\text{IO}_3)_2 \cdot \text{H}_2\text{O}$.

SOLUBILITY IN WATER.

(Trantz and Anschütz — Z. physik. Chem. 56, 238, '06.)

| t°. | Gms. $\text{Ba}(\text{IO}_3)_2$ per 100 Gms. Solution. | t°. | Gms. $\text{Ba}(\text{IO}_3)_2$ per 100 Gms. Solution. | t°. | Gms. $\text{Ba}(\text{IO}_3)_2$ per 100 Gms. Solution. |
|---------|--|-----|--|-----|--|
| - 0.046 | 0.008 | 30 | 0.031 | 70 | 0.093 |
| + 10 | 0.014 | 40 | 0.041 | 80 | 0.115 |
| 20 | 0.022 | 50 | 0.056 | 90 | 0.141 |
| 25 | 0.028 | 60 | 0.074 | 100 | 0.197 |

BARIUM IODIDE BaI_2 .

SOLUBILITY IN WATER.

(Kremers — Pogg. Ann. 103, 66, 1858; Etard — Ann. chim. phys. [7] 2, 544, '94.)

| t°. | Gms. BaI_2 per 100 Gms. Water. | Solid Phase. | t°. | Gms. BaI_2 per 100 Gms. Water. | Solid Phase. |
|------|---|--|-----|---|--|
| - 20 | 143.9 | 59.0 $\text{BaI}_2 \cdot 6 \text{H}_2\text{O}$ | 40 | 231.9 | 69.8 $\text{BaI}_2 \cdot 2 \text{H}_2\text{O}$ |
| 0 | 170.2 | 63.0 " | 60 | 247.3 | 71.2 " |
| + 10 | 185.7 | 65.0 " | 80 | 261.0 | 72.3 " |
| 20 | 203.1 | 67.0 " | 100 | 271.7 | 73.1 " |
| 25 | 212.5 | 68.0 " | 120 | 281.7 | 73.8 " |
| 30 | 219.6 | 68.7 " | 160 | 294.8 | 74.6 " |

Sp. Gr. of saturated solution at 19°.5 = 2.24.

For method of interpolating above results, see Note, page 33.

100 grams 97% Ethyl Alcohol dissolve 1.07 g. $\text{BaI}_2 \cdot 2 \text{H}_2\text{O}$ at 15°.

(Rohland — Z. anorg. Chem. 15, 417, 1897.)

BARIUM MALATE $\text{BaC}_4\text{H}_4\text{O}_8$.

SOLUBILITY IN WATER.

(Cantoni and Basadonna — Bull. soc. chim. [3] 35, 731, '06.)

| t°. | Gms. $\text{BaC}_4\text{H}_4\text{O}_8$ per 100 cc. Sol. | t°. | Gms. $\text{BaC}_4\text{H}_4\text{O}_8$ per 100 cc. Sol. | t°. | Gms. $\text{BaC}_4\text{H}_4\text{O}_8$ per 100 cc. Sol. |
|-----|--|-----|--|-----|--|
| 20 | 0.883 | 35 | 0.895 | 60 | 1.011 |
| 25 | 0.901 | 40 | 0.896 | 70 | 1.041 |
| 30 | 0.903 | 50 | 0.942 | 80 | 1.044 |

SOLUBILITY IN WATER AND IN ALCOHOL.

(Partheil and Hübner — Archiv. Pharm. 241, 413, '03.)

100 grams water dissolve 1.24 gms. $\text{BaC}_4\text{H}_4\text{O}_8$ at 18°, and 1.3631 gms. at 25°.100 grams 95% alcohol dissolve 0.0038 gms. $\text{BaC}_4\text{H}_4\text{O}_8$ at 18°, and 0.0039 gm. at 25°.**BARIUM MALONATE** $\text{BaC}_3\text{H}_2\text{O}_4 \cdot \text{N}_2\text{O}$.

SOLUBILITY IN WATER.

(Miczynski — Monatsh. Chem. 7, 263, '86.)

| t°. | Gms. $\text{BaC}_3\text{H}_2\text{O}_4$ per 100 Gms. Water. | Solution. | t°. | Gms. $\text{BaC}_3\text{H}_2\text{O}_4$ per 100 Gms. Water. | Solution. |
|-----|---|-----------|-----|---|-----------|
| 0 | 0.143 | 0.143 | 50 | 0.287 | 0.285 |
| 10 | 0.179 | 0.179 | 60 | 0.304 | 0.303 |
| 20 | 0.212 | 0.211 | 70 | 0.317 | 0.316 |
| 30 | 0.241 | 0.240 | 80 | 0.326 | 0.325 |
| 40 | 0.266 | 0.265 | | | |

BARIUM MOLYBDATE BaMoO_4 .100 parts water dissolve 0.0058 part BaMoO_4 at 23°.

(Smith and Bradbury — Ber. 24, 2930, '91.)

BARIUM NITRATE

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BARIUM NITRATE $\text{Ba}(\text{NO}_3)_2$.

SOLUBILITY IN WATER.

(Mulder; Gay Lussac; Etard — Ann. chim. phys. [7] 2, 528, 94; Euler — Z. physik. Chem. 49, 315, '04.)

| t°. | Gms. $\text{Ba}(\text{NO}_3)_2$ per 100 Gms. | | t°. | Gms. $\text{Ba}(\text{NO}_3)_2$ per 100 Gms. | |
|-----|---|-----------|-----|---|-----------|
| | Water. | Solution. | | Water. | Solution. |
| 0 | 5.0 | 4.8 | 80 | 27.0 | 21.3 |
| 10 | 7.0 | 6.5 | 100 | 34.2 | 25.5 |
| 20 | 9.2 | 8.4 | 120 | 42.0 | 29.6 |
| 25 | 10.4 | 9.4 | 140 | 50.0 | 33.3 |
| 30 | 11.6 | 10.6 | 160 | 58.0 | 36.7 |
| 40 | 14.2 | 12.4 | 180 | 67.0 | 40.1 |
| 50 | 17.1 | 14.6 | 200 | 76.0 | 43.2 |
| 60 | 20.3 | 16.9 | 215 | 84.5 | 45.8 |

Sp. Gr. of saturated solution at 19.5° = 1.072.

SOLUBILITY OF MIXTURES OF BARIUM NITRATE AND LEAD NITRATE IN WATER AT 25°.

(Fock. — Z. Kryst. Min. 28, 365, '97; at 17°, Euler — Z. physik. Chem. 49, 315, '04.)

| Sp. Gr. of Sol. of. | In Solution. | | | | | In Solid Phase. Mol. % Ba(NO ₃) ₂ |
|------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|---|--|
| | Gms. per Liter. | | Mg. Mols. per Liter. | | Mol. % Ba(NO ₃) ₂ . | |
| | Ba(NO ₃) ₂ . | Pb(NO ₃) ₂ . | Ba(NO ₃) ₂ . | Pb(NO ₃) ₂ . | | |
| I. 079 | 102.2 | 0 | 391.0 | 0 | 100 | 100 |
| I. 088 | 54.9 | 17.63 | 210.1 | 53.3 | 79.78 | 98.30 |
| I. 108 | 86.5 | 49.80 | 330.7 | 150.7 | 68.70 | 96.74 |
| I. 119 | 79.7 | 68.10 | 304.9 | 205.7 | 59.69 | 94.80 |
| I. 140 | 77.0 | 97.20 | 294.4 | 293.6 | 50.09 | 93.62 |
| I. 163 | 69.8 | 130.7 | 266.8 | 395.0 | 40.31 | 92.49 |
| I. 198 | 66.0 | 177.3 | 252.5 | 535.6 | 32.03 | 90.07 |
| I. 252 | 57.5 | 247.7 | 222.6 | 748.5 | 22.91 | 83.47 |
| I. 294 | 25.9 | 334.3 | 99.2 | 1010.3 | 8.11 | 75.44 |
| I. 376 | 28.8 | 429.7 | 110.3 | 1298.0 | 7.77 | 35.11 |
| I. 459 | ... | 553.8 | 0.0 | 1673.0 | 0.0 | 0.0 |

Tables of results are also given for 15°, 30°, and 47°.

SOLUBILITY OF MIXTURES OF BARIUM NITRATE AND POTASSIUM NITRATE IN WATER AT 25°.

(Foote — Am. Ch. J. 32, 252, '04.)

| Per 100 Grams Solution. | | Solid Phase. |
|-------------------------|---------------------------------------|---|
| Gms. KNO_3 . | Grams $\text{Ba}(\text{NO}_3)_2$. | |
| 14.89 | 6.62 | $\text{Ba}(\text{NO}_3)_2$ and 2 $\text{KNO}_3 \cdot \text{Ba}(\text{NO}_3)_2$ Double salt, |
| 16.30 | 5.49 | |
| 21.99 | 3.04 | 2 $\text{KNO}_3 \cdot \text{Ba}(\text{NO}_3)_2$ KNO_3 and 2 $\text{KNO}_3 \cdot \text{Ba}(\text{NO}_3)_2$ |
| 27.76 | 2.04 | |

SOLUBILITY OF BARIUM NITRATE IN AQUEOUS PHENOL SOLUTIONS AT 25°.

(Rothmund and Wilsmore — Z. physik. Chem. 40, 620, '02.)

| G. Mols. per Liter. | | Gms. per Liter. | | G. Mols. per Liter. | | Gms. per Liter. | |
|----------------------------------|-----------------------------------|----------------------------------|-----------------------------------|----------------------------------|-----------------------------------|----------------------------------|-----------------------------------|
| C ₆ H ₅ OH | Ba(NO ₃) ₂ | C ₆ H ₅ OH | Ba(NO ₃) ₂ | C ₆ H ₅ OH | Ba(NO ₃) ₂ | C ₆ H ₅ OH | Ba(NO ₃) ₂ |
| 0.000 | 0.3835 | 0.0 | 100.2 | 0.310 | 0.3492 | 29.12 | 91.31 |
| 0.045 | 0.3785 | 4.23 | 98.97 | 0.401 | 0.3400 | 37.73 | 88.90 |
| 0.082 | 0.3746 | 7.71 | 97.95 | 0.501 | 0.3299 | 47.11 | 86.26 |
| 0.146 | 0.3664 | 13.73 | 95.81 | 0.728 (sat.) | 0.3098 | 68.45 | 81.00 |

BARIUM NITRITE Ba(NO₂)₂·H₂O.

SOLUBILITY IN WATER.

(Vogel — Z. anorg. Chem. 35, 389, '03.)

| t°. | 0° | 20° | 25° | 30° | 35° |
|--|----|-----|-----|-----|-----|
| Gms. Ba(NO ₂) ₂ per 100 gms. H ₂ O | 58 | 63 | 71 | 82 | 97 |

BARIUM OXALATE BaC₂O₄.

SOLUBILITY OF THE THREE HYDRATES IN WATER.

(Groschuff — Ber. 34, 3318, '01.)

| t°. | BaC ₂ O ₄ · $\frac{1}{2}$ H ₂ O. | | BaC ₂ O ₄ ·2H ₂ O. | | BaC ₂ O ₄ · $\frac{1}{2}$ H ₂ O. | |
|-----|---|--|---|---|---|--|
| | Gms. BaC ₂ O ₄ per 1000 g. Sol. | G. M. BaC ₂ O ₄ per 100 Mol. H ₂ O. | Gms. BaC ₂ O ₄ per 1000 g. Sol. | G. M. BaC ₂ O ₄ per 100 G. M. H ₂ O. | Gms. BaC ₂ O ₄ per 1000 g. Sol. | G. M. BaC ₂ O ₄ per 100 Mol. H ₂ O. |
| 0 | 0.058 | 0.00046 | 0.053 | 0.00042 | 0.089 | 0.00070 |
| 9.5 | 0.082 | 0.00066 | ... | ... | ... | ... |
| 18 | 0.112 | 0.00090 | 0.089 | 0.00071 | 0.124 | 0.00099 |
| 30 | 0.170 | 0.00136 | 0.121 | 0.00097 | 0.140 | 0.00112 |
| 40 | ... | ... | 0.152 | 0.00122 | 0.151 | 0.00121 |
| 45 | ... | ... | 0.169 | 0.00135 | ... | ... |
| 50 | ... | ... | ... | ... | 0.164 | 0.00131 |
| 55 | ... | ... | 0.212 | 0.00170 | ... | ... |
| 60 | ... | ... | ... | ... | 0.175 | 0.00140 |
| 65 | ... | ... | 0.250 | 0.00200 | ... | ... |
| 73 | ... | ... | 0.285 | 0.00228 | ... | ... |
| 75 | ... | ... | ... | ... | 0.188 | 0.00151 |
| 90 | ... | ... | ... | ... | 0.200 | 0.00160 |
| 100 | ... | ... | ... | ... | 0.211 | 0.00169 |

SOLUBILITY OF BARIUM OXALATE (BaC₂O₄· $\frac{1}{2}$ H₂O) IN AQUEOUS ACETIC ACID AT 26°-27°.

(Herz and Muhs. — Ber. 36, 3715, '03.)

| Normality of Acetic Acid. | G. Residue* per 50.05 cc. Sol. | Gms. per 100 cc. Solution. | Normality of Acetic Acid. | G. Residue* per 50 cc. Sol. | Gms. per 100 cc. Solution |
|---------------------------|--------------------------------|-----------------------------------|---------------------------|-----------------------------|----------------------------------|
| | | CH ₃ COOH. Ba Oxalate. | | | CH ₃ COOH. Ba Oxalate |
| 0 | 0.0077 | 0.00 | 0.0154 | 3.85 | 0.0564 |
| 0.565 | 0.0423 | 3.39 | 0.0845 | 5.79 | 0.0511 |
| 1.425 | 0.0520 | 8.55 | 0.1039 | 17.30 | 0.0048 |
| 2.85 | 0.0556 | 17.11 | 0.1111 | ... | ... |

* Dried at 70°.

BARIUM ACID OXALATE 52

BARIUM ACID OXALATE $\text{BaC}_2\text{O}_4 \cdot \text{H}_2\text{C}_2\text{O}_4 \cdot 2\text{H}_2\text{O}$.

SOLUBILITY IN WATER.

(Groschuff.)

| t°. | Gms. per 100 Gms. Solution. | | Mols. per 100 Mols. H_2O . | | Mols. $\text{H}_2\text{C}_2\text{O}_4$ per 1 Mol. BaC_2O_4 . |
|------|------------------------------------|----------------------------|--|----------------------------|---|
| | $\text{H}_2\text{C}_2\text{O}_4$. | BaC_2O_4 . | $\text{H}_2\text{C}_2\text{O}_4$. | BaC_2O_4 . | |
| 0 | 0.27 | 0.030 | 0.054 | 0.0024 | 22 |
| 18 | 0.66 | 0.070 | 0.130 | 0.0056 | 24 |
| 20.5 | 0.76 | 0.076 | 0.15 | 0.0061 | 25 |
| 38 | 1.61 | 0.16 | 0.33 | 0.013 | 25 |
| 41 | 1.82 | 0.18 | 0.37 | 0.015 | 25 |
| 53 | 2.92 | 0.31 | 0.60 | 0.026 | 24 |
| 60 | 3.60 | 0.40 | 0.75 | 0.033 | 22.5 |
| 80 | 6.21 | 0.81 | 1.34 | 0.070 | 19 |
| 90 | 7.96 | 1.11 | 1.75 | 0.098 | 18 |
| 99 | 10.50 | 1.55 | 2.39 | 0.141 | 17 |

BARIUM PROPIONATE $\text{Ba}(\text{C}_2\text{H}_5\text{O}_2)_2 \cdot \text{H}_2\text{O}$. also $6\text{H}_2\text{O}$.

SOLUBILITY IN WATER.

(Krasnicki — Monatsh. Chem. 8, 597, '87.)

| t°. | Gms. $\text{Ba}(\text{C}_2\text{H}_5\text{O}_2)_2$ per 100 Gms. Solution. | | t°. | Gms. $\text{Ba}(\text{C}_2\text{H}_5\text{O}_2)_2$ per 100 Gms. Solution. | |
|-----|--|-----------|-----|--|-----------|
| | Water. | Solution. | | Water. | Solution. |
| 0 | 47.98 | 32.41 | 50 | 62.74 | 38.57 |
| 10 | 51.56 | 34.02 | 60 | 64.76 | 39.31 |
| 20 | 54.82 | 35.42 | 70 | 66.46 | 39.93 |
| 30 | 57.77 | 36.65 | 80 | 67.85 | 40.42 |
| 40 | 60.41 | 37.66 | .. | ... | ... |

BARIUM SULPHATE BaSO_4 .

SOLUBILITY IN WATER.

Electrolytic Conductivity Method.

(Holleman; Kohlrausch and Rose — Z. physik. Chem. 12, 131, 241, '93.)

| t° | 2° | 10° | 19° | 26° | 34° | 37.7° |
|-------------------------------|--------|--------|--------|--------|--------|--------|
| cc. BaSO_4 per liter | 0.0017 | 0.0020 | 0.0023 | 0.0026 | 0.0029 | 0.0031 |

SOLUBILITY OF BARIUM SULPHATE IN AQUEOUS SOLUTIONS OF HYDROCHLORIC AND OF NITRIC ACIDS.

(Banthisch — J. pr. Chem. 29, 54, 1884.)

| In Hydrochloric Acid. | | | | In Nitric Acid. | | | |
|---|---|-------------------------------|-------------------|---|---|-------------------------------|-------------------|
| cc. containing 1 Mg. Equiv. of HCl. | Mgs. BaSO_4 per 1 Mg. Equiv. of HCl. | Gms. per 100 cc. Solution. | | cc. containing 1 Mg. Equiv. of HNO_3 . | Mgs. BaSO_4 per 1 Mg. Equiv. of HNO_3 . | Gms. per 100 cc. Solution. | |
| | | HCl. | BaSO_4 . | | | HNO_3 . | BaSO_4 . |
| 2.0 | 0.133 | 1.82 | 0.0067 | 2.0 | 0.140 | 3.15 | 0.0070 |
| 1.0 | 0.089 | 3.65 | 0.0089 | 1.0 | 0.107 | 6.31 | 0.0107 |
| 0.5 | 0.056 | 7.29 | 0.0101 | 0.5 | 0.085 | 12.61 | 0.0170 |
| 0.2 | 0.017 | 18.23 | 0.0086 | 0.2 | 0.048 | 31.52 | 0.0241 |

100 cc. HBr dissolve 0.04 gms. BaSO_4 ; 100 cc. HI dissolve 0.0016 gms. BaSO_4 at the boiling point.

(Haslam — Chem. News 53, 87, '86.)

SOLUBILITY OF BARIUM SULPHATE IN AQUEOUS SOLUTIONS OF IRON,
ALUMINUM AND MAGNESIUM CHLORIDES AT 20° — 25°.

(Fraps. — Am. Ch. J. 27, 290, '01.)

| Gms. Chloride per Liter. | Milligrams BaSO ₄ per Liter in: | | | Gms. Chloride per Liter. | Mgs. BaSO ₄ per Liter in: | | |
|--------------------------------|--|-------------------------|-------------------------|--------------------------------|--------------------------------------|-------------------------|-------------------------|
| | Aq. FeCl ₃ . | Aq. AlCl ₃ . | Aq. MgCl ₂ . | | Aq. FeCl ₃ . | Aq. AlCl ₃ . | Aq. MgCl ₂ . |
| 1 | 58 | 33 | 30 | 25 | 150 | 116 | 50 |
| 2½ | 72 | 43 | 30 | 50 | 160 | 170 | 50 |
| 5 | 115 | 60 | 33 | 100 | 170 | 175 | 50 |
| 10 | 123 | 94 | 33 | ... | ... | ... | .. |

BARIUM PerSULPHATE BaS₂O₈·4H₂O.

100 parts water dissolve 39.1 parts BaS₂O₈, or 52.2 parts BaS₂O₈·4H₂O at 0°.

(Marshall — J. Ch. Soc. 59, 771, '91.

BARIUM SULPHITE BaSO₃.

SOLUBILITY IN WATER AND IN AQUEOUS SUGAR SOLUTIONS.

(Rogowicz — Z. Ver Zuckerind. 938, 1905.)

| Conc. of Sugar Sol. | Gm. BaSO ₃ per 100 cc. Sol. | | Conc. of Sugar Sol. | Gm. BaSO ₃ per 100 cc. Sol. | |
|------------------------|--|---------|------------------------|--|---------|
| | at 20°. | at 80°. | | at 20°. | at 80°. |
| 0° Bx | 0.0197 | 0.00177 | 40° Bx | 0.0048 | 0.00158 |
| 10° " | 0.0104 | 0.00335 | 50° " | 0.0030 | 0.00149 |
| 20° " | 0.0097 | 0.00289 | 60° " (sat.) | 0.0022 | 0.00112 |
| 30° " | 0.0078 | 0.00223 | ... | ... | ... |

BARIUM SUCCINATE AND BARIUM ISO SUCCINATE



SOLUBILITY OF EACH IN WATER.

(Miczynski — Monatsh. Chem. 7, 263, 1886.)

| t°. | Gms. Ba. Succinate per 100 Gms. | | Gms. Ba. Iso Succinate per 100 Gms. | |
|-----|------------------------------------|-----------|--|-----------|
| | Water. | Solution. | Water. | Solution. |
| 0 | 0.421 | 0.420 | 1.884 | 1.849 |
| 10 | 0.432 | 0.430 | 2.852 | 2.774 |
| 20 | 0.418 | 0.417 | 3.618 | 3.493 |
| 30 | 0.393 | 0.392 | 4.181 | 4.014 |
| 40 | 0.366 | 0.365 | 4.542 | 4.346 |
| 50 | 0.337 | 0.336 | 4.700 | 4.594 |
| 60 | 0.306 | 0.305 | 4.656 | 4.450 |
| 70 | 0.273 | 0.272 | 4.410 | 4.224 |
| 80 | 0.237 | 0.237 | 3.962 | 3.810 |

100 gms. H₂O dissolve 0.396 gms. Ba Succinate at 18° and 0.410 gms. at 25°.

100 gms. 95% alcohol dissolve 0.0015 gms. Ba Succinate at 18° and 0.0016 gms. at 25°.

(Partheil and Hübner — Archiv. Pharm. 241, 413, '03.)

BARIUM TARTRATE Ba(C₂H₃O₃)₂.

SOLUBILITY IN WATER.

(Cantoni and Zachoder — Bull. soc. chim. [3] 33, 751, '05; see also Partheil and Hübner.)

| t°. | Gms. Ba(C ₂ H ₃ O ₃) ₂ per 100 cc. Solution. | | t°. | Gms. Ba(C ₂ H ₃ O ₃) ₂ per 100 cc. Solution. | | t°. | Gms. Ba(C ₂ H ₃ O ₃) ₂ per 100 cc. Solution. | |
|-----|---|--|-----|---|--|-----|---|--|
| | | | | | | | | |
| 0 | 0.0205 | | 30 | 0.0315 | | 70 | 0.0480 | |
| 10 | 0.0242 | | 40 | 0.0352 | | 80 | 0.0527 | |
| 20 | 0.0279 | | 50 | 0.0389 | | 90 | 0.0541 | |
| 25 | 0.0297 | | 60 | 0.0440 | | .. | ... | |

SOLUBILITY OF BARIUM TARTRATE IN AQUEOUS ACETIC ACID SOLUTIONS at 26°-27°.

(Herz and Muhs — Ber. 36, 3715, '03.)

| Normality of Acetic Acid. | Gms. residue* per 50 cc. Sol. | Gms. per 100 cc. Solution. | | Normality of Acetic Acid. | Gms. residue* per 50 cc. Sol. | Gms. per 100 cc. Solution. | |
|---------------------------|-------------------------------|----------------------------|--------------|---------------------------|-------------------------------|----------------------------|--------------|
| | | CH ₃ COOH. | Ba tartrate. | | | CH ₃ COOH. | Ba tartrate. |
| 0 | 0.0328 | 0.0 | 0.0655 | 3.77 | 0.1866 | 22.62 | 0.3728 |
| 0.565 | 0.1151 | 3.39 | 0.2300 | 5.65 | 0.1865 | 33.90 | 0.3726 |
| 1.425 | 0.1559 | 8.55 | 0.3115 | 16.85 | 0.0218 | 101.10 | 0.0436 |
| 2.85 | 0.1739 | 17.11 | 0.3475 | ... | ... | ... | ... |

* Dried at 70°.

100 grams 95% alcohol dissolve 0.032 gm. Ba tartrate at 18° and 0.0356 gm. at 25°.

(Partheil and Hübner.)

BENZALDEHYDE C₆H₅COH.

100 gms. H₂O dissolve 0.3 gm. benzaldehyde at room temperature.

(Fluckiger — Arch. Pharm. [3] 7, 103, '75.)

BENZAMIDE C₆H₅CONH₂.

SOLUBILITY IN ETHYL ALCOHOL.

(Speyers — Am. J. Sci. [4] 14, 295, '02.)

| t°. | Sp. Gr. of Solutions. | G. M. C ₆ H ₅ CONH ₂ per 100 G.M. C ₂ H ₅ OH. | Gms. C ₆ H ₅ CONH ₂ per 100 Gms. C ₂ H ₅ OH. | t°. | Sp. Gr. of Solutions. | G. M. C ₆ H ₅ CONH ₂ per 100 G.M. C ₂ H ₅ OH. | Gms. C ₆ H ₅ CONH ₂ per 100 Gms. C ₂ H ₅ OH. |
|-----|-----------------------|--|---|-----|-----------------------|--|---|
| 0 | 0.833 | 3.1 | 8.15 | 40 | 0.848 | 11.0 | 28.92 |
| 10 | 0.832 | 4.2 | 11.04 | 50 | 0.862 | 14.2 | 37.34 |
| 20 | 0.833 | 5.9 | 15.52 | 60 | 0.881 | 17.2 | 45.22 |
| 25 | 0.835 | 6.8 | 17.87 | 70 | 0.913 | 20.4 | 53.63 |
| 30 | 0.838 | 8.2 | 21.56 | .. | ... | ... | ... |

SOLUBILITY OF BENZAMIDE IN MIXTURES OF ALCOHOL AND WATER AT 25°.

(Holleman and Antusch — Rec. trav. chim. 13, 294, '94.)

| Vol. % Alcohol. | Gms. C ₆ H ₅ CONH ₂ per 100 Gms. Solvent. | Sp. Gr. of Solutions. | Vol. % Alcohol. | Gms. C ₆ H ₅ CONH ₂ per 100 Gms. Solvent. | Sp. Gr. of Solutions. |
|-----------------|--|-----------------------|-----------------|--|-----------------------|
| 100 | 17.03 | 0.830 | 70 | 23.87 | 0.925 |
| 95 | 21.12 | 0.856 | 60 | 18.98 | 0.939 |
| 90 | 24.50 | 0.878 | 50 | 13.74 | 0.949 |
| 85 | 26.15 | 0.895 | 40 | 8.62 | 0.958 |
| 83 | 26.63 | 0.900 | 31 | 5.33 | 0.967 |
| 80 | 26.43 | 0.907 | 15 | 2.28 | 0.912 |
| 75 | 25.41 | 0.917 | 0 | 1.35 | 0.999 |

BENZENE C₆H₆.

SOLUBILITY IN WATER AT 22°.

(Herz — Ber. 31, 2671, '98.)

100 cc. water dissolve 0.082 cc. C₆H₆, Vol. of Sol. = 100.082, Sp. Gr. = 0.9979.

100 cc. C₆H₆ dissolve 0.211 cc. H₂O, Vol. of sol. = 100.135, Sp. Gr. = 0.8768.

BENZENE, ACETIC ACID, WATER MIXTURES.

(Lincoln — J. Physic. Chem. 8, 251, '04.)

NOTE. — To mixtures of known amounts of acetic acid and benzene, water was gradually added until clouding occurred. The same degree of clouding did not represent the end point in all cases, as was assumed by Waddell. (J. Physic. Chem. 4, 161, '00.)

| At 25°. | | | At 35°. | | |
|---------------------------|-------------------------------------|-----------------------|---------------------------|-------------------------------------|-----------------------|
| cc. CH ₃ COOH. | cc. C ₆ H ₆ . | cc. H ₂ O. | cc. CH ₃ COOH. | cc. C ₆ H ₆ . | cc. H ₂ O. |
| 5 | 10.06 | 0.45 | 100 | 18.10 | 1.14 |
| 5 | 8.04 | 0.55 | 100 | 16.09 | 1.22 |
| 5 | 6.03 | 0.64 | 100 | 10.06 | 1.55 |
| 5 | 3.02 | 0.98 | 100 | 6.03 | 2.17 |
| 5 | 2.01 | 1.28 | 100 | 4.02 | 2.77 |
| 5 | 1.01 | 1.89 | 100 | 3.01 | 3.26 |
| 5 | 0.60 | 2.80 | 100 | 1.00 | 7.01 |
| 5 | 0.35 | 4.54 | 100 | 0.65 | 10.10 |
| 5 | 0.17 | 9.53 | 100 | 0.47 | 13.64 |

BENZENE, Aq. ALCOHOL MIXTURES; BENZENE, Aq. ACETONE MIXTURES AT 20°.

H₂O added to mixtures of known amounts of the other two and appearance of clouding noted.

(Bancroft — Phys. Rev. 3, 31, 1895, 96.)

C₆H₆, C₂H₅OH and H₂O C₆H₆, CH₃OH and H₂O C₆H₆, (CH₃)₂CO and H₂O

| Per 5 cc. C ₂ H ₅ OH. | | Per 5 cc. CH ₃ OH. | | Per 5 cc. (CH ₃) ₂ CO. | |
|---|-------------------------------------|-------------------------------|-------------------------------------|---|-------------------------------------|
| cc. H ₂ O. | cc. C ₆ H ₆ . | cc. H ₂ O. | cc. C ₆ H ₆ . | cc. H ₂ O. | cc. C ₆ H ₆ . |
| 20 | 0.03 | 5.0 | 0.15 | 8.0 | 0.10 |
| 8 | 0.13 | 3.0 | 0.215 | 3.0 | 0.395 |
| 4 | 0.39 | 2.0 | 0.59 | 2.0 | 0.69 |
| 2 | 1.17 | 1.4 | 1.0 | 1.3 | 1.0 |
| 1.5 | 1.87 | 1.0 | 1.9 | 0.51 | 2.0 |
| 1.0 | 3.57 | 0.8 | 3.0 | 0.295 | 3.0 |
| 0.605 | 8.0 | 0.69 | 4.0 | 0.2 | 4.0 |
| 0.34 | 20.0 | 0.49 | 8.0 | 0.15 | 5.0 |

MUTUAL SOLUBILITY OF BENZENE AND β NAPHTHALENE PICRATE, C₆H₅(NO₂)₃OH.C₁₀H₇OH.

"Synthetic Method" used — see Note, p. 9.

(Kuriloff — Z. physik. Chem. 24, 442, '97.)

| t°. | Gms. Picrate. | Gms. Benzene. | α | t°. | Gms. Picrate. | Gms. Benzene. | α |
|-------|---------------|---------------|----------|-------|---------------|---------------|----------|
| 157 | 100.0 | ... | 100.0 | 111.6 | 1.173 | 1.037 | 19.2 |
| 148.4 | 2.128 | 0.115 | 79.3 | 102.0 | 1.087 | 1.780 | 11.2 |
| 137.4 | 1.274 | 0.170 | 61.1 | 29.5 | 0.390 | 8.430 | 0.95 |
| 134.2 | 1.384 | 0.297 | 49.3 | 4.6 | 1.329 | 21.80 | 0.48 |
| 126.8 | 1.019 | 0.343 | 38.3 | 5.02 | ... | 100.0 | ... |

α = Mols. β Naphthalene Picrate per 100 Mols. of β Naphthalene Picrate plus Benzene.

Determinations for a large number of isothermes are also given.

SOLUBILITY OF BENZENE IN SULPHUR.

By "Synthetic Method," see Note, p. 9.

(Alexejew — Ann. Physik. Chem. 28, 305, '86.)

| t°. | Gms. C ₆ H ₆ per 100 Gms. | | t°. | Gms. C ₆ H ₆ per 100 Gms. | |
|-----|---|--------------------------------------|-------------------|---|--------------------------------------|
| | S Layer. | C ₆ H ₆ Layer. | | S Layer. | C ₆ H ₆ Layer. |
| 100 | 6 | 75 | 140 | 16 | 61 |
| 110 | 8 | 72.5 | 150 | 19 | 55 |
| 120 | 10 | 70 | 160 | 25 | 45 |
| 130 | 12 | 66 | 164 (crit. temp.) | 35 | |

Di Brom **BENZENE** (p) C₆H₄Br₂.

SOLUBILITY IN ETHYL, PROPYL, ISO BUTYL ALCOHOLS, ETC.

(Schröder — Z. physik. Chem. 11, 456, '03.)

Determinations by "Synthetic Method" see Note, p. 9.

| t°. | Grams C ₆ H ₄ Br ₂ (p) per 100 Grams Sat. Solution in: | | | | | | |
|-----|---|-----------------------------------|---|--|-------------------|---------------------------------|---|
| | C ₂ H ₅ OH. | C ₃ H ₇ OH. | (CH ₃)CH ₂ CH ₂ OH. | (C ₂ H ₅) ₂ O. | CS ₂ . | C ₆ H ₆ . | C ₆ H ₄ Br ₂ . |
| 0 | ... | .. | ... | .. | 27 | .. | .. |
| 10 | ... | .. | ... | 30 | 34 | 34 | 22 |
| 20 | ... | .. | ... | 38 | 43 | 43 | 29 |
| 30 | 14 | .. | 15 | 47 | 53 | 53 | 36 |
| 40 | 19 | .. | 20 | 57 | 62 | 62 | 45 |
| 50 | 26 | 27 | 30 | 67 | 72 | 71 | 54 |
| 60 | 38 | 40 | 44 | 77 | 81 | 80 | 67 |
| 70 | 57.6 | 67 | 65 | 87 | 90 | 88 | 79 |
| 75 | 80.5 | 85 | 77 | .. | .. | .. | 84 |
| 80 | 94.4 | 95 | 94.6 | .. | .. | .. | 90 |

Chlor **BENZENE** C₆H₅Cl.

SOLUBILITY OF CHLOR BENZENE IN SULPHUR.

"Synthetic Method," see page 9.

(Alexejew.)

| t°. | Grams C ₆ H ₅ Cl per 100 Grams. | |
|-------------------|---|----------------------|
| | Sulphur Layer. | Chlor Benzene Layer. |
| 90 | 13 | 70 |
| 100 | 18.5 | 63 |
| 110 | 27 | 53 |
| 116 (crit. temp.) | 38 | |

For the solubility of Mixtures of di Chlor Benzene and di Brom Benzene in aqueous Ethyl Alcohol solutions see Thiel.

(Z. physik. Chem. 43, 656, 1903.)

Di Nitro **BENZENE** (m) C₆H₄(NO₂)₂.

SOLUBILITY IN BENZENE, BROM BENZENE AND IN CHLOROFORM.

"Synthetic Method."

(Schröder.)

| t°. | Gms. C ₆ H ₄ (NO ₂) ₂ per 100 Gms. Sol. in: | | | t°. | Gms. C ₆ H ₄ (NO ₂) ₂ per 100 Gms. Sol. in: | | |
|-----|--|-----------------------------------|---------------------|-----|--|-----------------------------------|---------------------|
| | C ₆ H ₆ . | C ₆ H ₅ Br. | CHCl ₃ . | | C ₆ H ₆ . | C ₆ H ₅ Br. | CHCl ₃ . |
| 15 | 17.5 | ... | 22.2 | 40 | 52.0 | 38.0 | 42.0 |
| 20 | 26.0 | 18.5 | 25.0 | 50 | 62.5 | 47.5 | 52.5 |
| 25 | 33.0 | 23.7 | 29.0 | 60 | 71.0 | 57.0 | 65.0 |
| 30 | 40.0 | 28.7 | 33.0 | .. | ... | ... | ... |

Solubilities of Di-Nitro **BENZENES** and of Tri-Nitro **BENZENES** in Several Solvents.

(de Bruyn — Rec. trav. chim. 13, 116, 150, '94.)

| Solvent. | t°. | Grams per 100 Grams Solvent. | | | | |
|-----------------------|--------|--|--|--|--|---|
| | | (o)C ₆ H ₄ (NO ₂) ₂ | (m)C ₆ H ₄ (NO ₂) ₂ | (p)C ₆ H ₄ (NO ₂) ₂ | (s)C ₆ H ₃ (NO ₂) ₃ | (as)C ₆ H ₃ (NO ₂) ₃ |
| Methyl Alcohol | 20.5 | 3.30 | 6.75 | 0.69 | 4.9 (16°) | 16.2 (15.5°) |
| Ethyl Alcohol | 20.5 | 1.9 | 3.5 | 0.4 | 1.9 (16°) | 5.45 (15.5°) |
| Propyl Alcohol | 20.5 | 1.09 | 2.4 | 0.298 | ... | ... |
| Carbon Bi-Sulphide | 17.6 | 0.236 | 1.35 | 0.148 | 0.25 | ... |
| Chloroform | 17.6 | 27.1 | 32.4 | 1.82 | 6.1 | ... |
| Benzene | 18.2 | 5.66 | 39.45 | 2.56 | 6.2 (16°) | ... |
| Ether | 17.5 | ... | ... | ... | 1.5 | ... |
| Ethyl Acetate | 18.2 | 12.96 | 36.27 | 3.56 | ... | ... |
| Toluene | 16.2 | 3.62 | 30.66 | 2.36 | ... | ... |
| Carbon Tetra Chloride | 16.2 | 0.143 | 1.18 | 0.12 | ... | ... |
| Water | (ord.) | 0.014 | 0.0525 | 0.008 | ... | ... |

Symmetrical Tri-Nitro **BENZENE**.

SOLUBILITY IN AQUEOUS ALCOHOL AT 25°.

(Holleman and Antusch — Rec. trav. chim. 13, 296, '94.)

| Vol. % Alcohol. | G. C ₆ H ₃ (NO ₂) ₃ (s) per 100 g. Solvent. | Sp. Gr. of Solutions. | Vol. % Alcohol. | G. C ₆ H ₃ (NO ₂) ₃ (s) per 100 g. Solvent. | Sp. Gr. of Solutions. |
|-----------------|--|-----------------------|-----------------|--|-----------------------|
| 100 | 2.34 | 0.7957 | 80 | 0.57 | 0.8582 |
| 95 | 1.57 | 0.8131 | 75 | 0.47 | 0.8708 |
| 90 | 1.12 | 0.8288 | 70 | 0.37 | 0.8808 |
| 85 | 0.79 | 0.8436 | 60 | 0.23 | 0.9064 |

BENZOYL PHENYL HYDRAZINE C₆H₅.NH.NH.C₆H₅O.

SOLUBILITY IN AQUEOUS ALCOHOL.

(Holleman and Antusch — Rec. trav. chim. 13, 291, '94.)

| Vol. % Alcohol. | Gms. Hydrazine per 100 g. Solvent. | Sp. Gr. Solutions. | Vol. % Alcohol. | Gms. Hydrazine per 100 g. Solvent. | Sp. Gr. Solutions. |
|-----------------|------------------------------------|--------------------|-----------------|------------------------------------|--------------------|
| 100 | 2.39 | 0.793 | 80 | 1.59 | 0.859 |
| 95 | 2.43 | 0.814 | 70 | 1.08 | 0.884 |
| 93 | 3.00 | 0.822 | 55 | 0.51 | 0.917 |
| 90 | 2.26 | 0.831 | 40 | 0.16 | 0.946 |

BENZO SULPHONIC ACIDS.

SOLUBILITY IN WATER.

(Bahlman — Liebig's Ann. 186, 309, '77.)

| Name of Acid. | Gms. Sulphonic Acid per 100 Gms. Solution at: | |
|---|---|--------------|
| o-Amido benzo sulphonic acid. | 11° = 1.301 | 15° = 1.436 |
| Amido brom benzo sulphonic acid. | 8° = 0.737 | 16° = 1.131* |
| Mono brom amido benzo sulphonic acid. | 12° = 0.431 | 15° = 0.463 |
| Barium di-brom benzo sulphonic acid. | 14° = 1.713 | 9° = 1.098 |
| Barium nitro brom benzo sulphonic acid (hydrated). | 16° = 0.527 | 30° = 0.914 |
| Barium nitro brom benzo sulphonic acid (anhydrous). | 8° = 0.156 | |

* At 18° = 1.201.

BENZINE

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BENZINE (Petroleum) $C_6H_{12}C_8H_{14}$.

100 parts of alcohol dissolve about 16 parts benzine of 0.638—0.660 Sp. Gr., at 25°.

BENZOIC ACID C_6H_5COOH .

SOLUBILITY IN WATER.

(Bourgoin — Ann. chim. phys. [5] 15, 171, '78.)

| t°. | Grams. C_6H_5COOH per 100 Gms. | | t°. | Grams. C_6H_5COOH per 100 Gms. | |
|-----|-------------------------------------|-----------|-----|-------------------------------------|-----------|
| | Water. | Solution. | | Water. | Solution. |
| 0 | 0.170 | 0.170 | 40 | 0.555 | 0.551 |
| 10 | 0.210 | 0.209 | 50 | 0.775 | 0.768 |
| 20 | 0.290 | 0.289 | 60 | 1.155 | 1.142 |
| 25 | 0.345 | 0.343 | 80 | 2.715 | 2.643 |
| 30 | 0.410 | 0.408 | 100 | 5.875 | 5.549 |

100 grams saturated aqueous solution contains 0.340 gram C_6H_5COOH at 25°; 0.353 gram at 26.4°; 0.667 gram at 45°.

(Paul — Z. phys. Ch. 14, 111, '04; Noyes and Chapin — *Ibid.* 27, 443, '08; Hoffman and Langbeck — *Ibid.* 51, 393, '05; Philip — J. Ch. Soc. 87, 992, '05; see also Alexejew — Ann. Phys. Ch. 28, 305, '86; Ost — J. pr. Ch. [2] 17, 232, '78; Vaubel — *Ibid.* [2] 52, 73, '95.)

SOLUBILITY OF MIXTURES OF LIQUID BENZOIC ACID AND WATER. (Alexejew.)

Determinations by "Synthetic Method," see Note, p. 9. Figures read from curve.

| t°. | Gms. C_6H_5COOH per 100 Gms. | | t°. | Gms. C_6H_5COOH per 100 Gms. | |
|-----|--------------------------------|--------------------|-------------------|--------------------------------|--------------------|
| | Aq. Layer. | Benzoic Ac. Layer. | | Aq. Layer. | Benzoic Ac. Layer. |
| 70 | 6 | 83 | 100 | 12.0 | 69.0 |
| 80 | 7.5 | 79.5 | 110 | 18.0 | 59.0 |
| 90 | 8.5 | 76 | 116 (crit. temp.) | 35 | |

SOLUBILITY OF BENZOIC ACID IN AQUEOUS SOLUTIONS OF: (Hoffman and Langbeck.)

Potassium Chloride at 25°.

| Normality of Aq. KCl. | Gms. KCl. per Liter. | Dissolved C_6H_5COOH . | |
|-----------------------------|-------------------------------|--------------------------|---------------|
| | | Mol. Conc. | Wt. per cent. |
| 0.02 | 1.49 | $5.0254 \cdot 10^{-4}$ | 0.339 |
| 0.05 | 3.73 | 4.9801 | 0.333 |
| 0.20 | 14.92 | 4.7639 | 0.322 |
| 0.50 | 37.30 | 4.3632 | 0.295 |

Potassium Nitrate at 25°.

| Normality of Aq. KNO_3 . | Gms. KNO_3 per Liter. | Dissolved C_6H_5COOH . | |
|----------------------------------|----------------------------------|--------------------------|---------------|
| | | Mol. Conc. | Wt. per cent. |
| 0.02 | 2.02 | $5.0326 \cdot 10^{-4}$ | 0.340 |
| 0.05 | 5.06 | 5.0421 | 0.341 |
| 0.20 | 20.24 | 5.0297 | 0.340 |
| 0.50 | 50.59 | 4.9400 | 0.334 |
| 1.00 | 101.19 | 4.7646 | 0.322 |

SOLUBILITY OF BENZOIC ACID IN AQUEOUS SOLUTIONS OF: (Hoffmann and Langbeck.)

Sodium Chloride.

| Normality of Aq. NaCl. | Gms. NaCl per Liter. | Gms. C_6H_5COOH per 100 Gms. Sol. at 25°. | |
|------------------------------|-------------------------------|---|---------|
| | | at 25°. | at 45°. |
| 0.00 | 0.00 | 0.340 | 0.667 |
| 0.02 | 1.17 | 0.339 | 0.663 |
| 0.05 | 2.93 | 0.335 | 0.654 |
| 0.20 | 11.70 | 0.336 | 0.617 |
| 0.50 | 29.25 | 0.282 | 0.546 |
| 1.00 | 58.50 | ... | 0.449 |

Sodium Nitrate.

| Normality of Aq. $NaNO_3$. | Gms. $NaNO_3$ per Liter. | Gms. C_6H_5COOH per 100 Gms. Sol. at 25°. | |
|-----------------------------------|-----------------------------------|---|---------|
| | | at 25°. | at 45°. |
| 0.00 | 0.00 | 0.340 | 0.666 |
| 0.05 | 8.51 | 0.339 | 0.663 |
| 0.20 | 17.02 | 0.333 | 0.647 |
| 0.50 | 42.54 | 0.319 | 0.613 |
| 1.00 | 85.09 | 0.294 | ... |

SOLUBILITY OF BENZOIC ACID IN AQUEOUS SOLUTIONS OF SODIUM ACETATE, FORMATE, BUTYRATE, AND SALICYLATE.

(Noyes and Chapin — Z. physik. Chem. 27, 443, '98; Philip — J. Ch. Soc. 87, 992, '05.)

| Grams Sodium Salt per Liter. | Grams C_6H_5COOH per Liter of Solution in: | | | | | |
|------------------------------|--|-----------|------------|-----------|-----------------|--------------------|
| | CH_3COONa . | | $HCOONa$. | | C_3H_7COONa . | $C_6H_5OH.COONa$. |
| | At 25°. | At 26.4°. | At 25°. | At 26.4°. | At 26.4°. | At 26.4°. |
| 0 | 3.41 | 3.53 | 3.41 | 3.53 | 3.53 | 3.53 |
| 1 | 4.65 | 4.75 | 4.25 | 4.35 | 4.50 | 3.62 |
| 2 | 5.70 | 5.85 | 4.75 | 4.85 | 5.40 | 3.70 |
| 3 | 6.70 | 6.90 | 5.20 | 5.30 | 6.15 | 3.80 |
| 4 | 7.60 | 7.85 | 5.60 | 5.70 | 6.90 | 3.87 |
| 6 | ... | ... | ... | ... | 8.40 | 4.00 |
| 8 | ... | ... | ... | ... | ... | 4.10 |

| Gram. Mols. Sodium Salt per Liter. | Gram Molecules C_6H_5COOH per Liter of Solution in: | | | | | |
|------------------------------------|---|-----------|------------|-----------|-----------------|--------------------|
| | CH_3COONa . | | $HCOONa$. | | C_3H_7COONa . | $C_6H_5OH.COONa$. |
| | At 25°. | At 26.4°. | At 25°. | At 26.4°. | At 26.4°. | At 26.4°. |
| 0.00 | 0.0279 | 0.0289 | 0.0279 | 0.0289 | 0.0289 | 0.0289 |
| 0.01 | 0.0362 | 0.0370 | 0.0330 | 0.0336 | 0.0376 | 0.0300 |
| 0.02 | 0.0440 | 0.0448 | 0.0364 | 0.0372 | 0.0455 | 0.0312 |
| 0.03 | 0.0508 | 0.0518 | 0.0392 | 0.0398 | 0.0525 | 0.0321 |
| 0.04 | 0.0572 | 0.0586 | 0.0416 | 0.0423 | 0.0596 | 0.0328 |
| 0.06 | ... | ... | 0.0460 | 0.0466 | ... | 0.0342 |

SOLUBILITY OF BENZOIC ACID IN ABSOLUTE ALCOHOLS.

(Timofeev — Compt. rend. 112, 1137, '91; at 15°, Bourgoin — Ann. chim. phys., [5] 13, 406, '78.)

In Methyl Alcohol.

In Ethyl Alcohol.

In Propyl Alcohol.

| t°. | G. C_6H_5COOH per 100 Gms. | | G. C_6H_5COOH per 100 Gms. | | G. C_6H_5COOH per 100 Gms. | |
|-----|------------------------------|-----------|------------------------------|-----------|------------------------------|-----------|
| | CH_3OH . | Solution. | C_2H_5OH . | Solution. | C_3H_7OH . | Solution. |
| 3 | 50.16 | 33.39 | 40.16 | 28.65 | 29.88 | 23.00 |
| 15 | ... | ... | 46.70 | 31.80 | ... | ... |
| 21 | 69.29 | 40.93 | 54.09 | 35.10 | 40.64 | 28.90 |

SOLUBILITY OF BENZOIC ACID IN 90% ALCOHOL, IN ETHER AND IN CHLOROFORM.

(Bourgoin.)

| Solvent. | t°. | Gms. C_6H_5COOH per 100 Grams. | |
|-------------|-----|----------------------------------|-----------|
| | | Solvent. | Solution. |
| 90% Alcohol | 15 | 41.62 | 29.39 |
| Ether | 15 | 31.35 | 23.86 |
| Chloroform | 25 | 14.30 | 12.50 |

SOLUBILITY OF BENZOIC ACID IN AQUEOUS SOLUTIONS OF DEXTROSE.

(Hoffman and Langbeck.)

| Normality of Aq. Dextrose. | Gms. $C_6H_5O_6$ per Liter. | Dissolved C_6H_5COOH at 25°. | | Dissolved C_6H_5COOH at 45°. | |
|----------------------------|-----------------------------|--------------------------------|------------------|--------------------------------|------------------|
| | | Mol. Conc. | Weight Per Cent. | Mol. Conc. | Weight Per Cent. |
| 0.02 | 3.67 | $5.0322 \cdot 10^{-4}$ | 0.34 | $9.9088 \cdot 10^{-4}$ | 0.674 |
| 0.05 | 9.00 | 5.0403 " | 0.34 | 9.9328 " | 0.669 |
| 0.204 | 36.73 | 5.0303 " | 0.34 | 9.9323 " | 0.669 |
| 0.533 | 96.15 | 5.0321 " | 0.34 | 10.0101 " | 0.674 |
| 1.068 | 192.30 | 5.0443 " | 0.341 | 10.0369 " | 0.676 |

SOLUBILITY OF BENZOIC ACID IN AQUEOUS SOLUTIONS OF UREA AND OF THIO UREA.

(Hoffman and Langbeck.)

| | Normality of Solution. | Gms. per Liter. | C ₆ H ₅ COOH Dissolved at 25°. | |
|----------------------|---------------------------|--------------------|--|---------------------------------|
| | | | Mol. Conc. | Wt. per cent. |
| In Aqueous Urea | 0.10 | 6.01 | CO(NH ₂) ₂ | 5.1876 · 10 ⁻⁴ 0.350 |
| In Aqueous Thio Urea | 0.20 | 15.23 | CS(NH ₂) ₂ | 5.4994 " 0.372 |

Amido BENZOIC ACIDS C₆H₄.NH₂.COOH (m).

SOLUBILITY IN WATER AND IN OTHER SOLVENTS.

(de Coninck — Compt. rend. 116, 758, '93.)

| In Water. | | Solvent. | In Organic Solvents. | |
|-----------|---|-----------------------|----------------------|--|
| t°. | Gms. C ₆ H ₄ NH ₂ .COOH(m) per 100 cc. H ₂ O. | | t°. | Gms. C ₆ H ₄ NH ₂ .COOH(m) per 100 cc. Solvent. |
| 0 | 0.43 | Ethyl Alcohol (95%) | 12.5 | 2.92 |
| 10 | 0.52 | Methyl Alcohol (pure) | 10.5 | 4.05 |
| 20 | 0.67 | Acetone | 11.3 | 6.22 |
| 30 | 0.87 | Methyl Iodide | 10.0 | 0.04 |
| 40 | 1.15 | Ethyl Iodide | 0.0 | 0.02 |
| 50 | 1.50 | Chloroform | 12.0 | 0.07 |
| 60 | 2.15 | Bromoform | 8.0 | trace |
| 70 | 3.15 | | | |

SOLUBILITY OF THE THREE ISOMERIC AMIDO NITRO BENZOIC ACIDS.

| In Ether. | | | | In Ethyl Alcohol (90%). | | | |
|-----------|--|-------|-------|-------------------------|--|-------|-------|
| t°. | Gms. C ₆ H ₃ NO ₂ NH ₂ .COOH per 100 cc. Ether. | | | t°. | Gms. C ₆ H ₃ NO ₂ NH ₂ .COOH per 100 cc. Alcohol. | | |
| | Ortho. | Meta. | Para. | | Ortho. | Meta. | Para. |
| 2.7 | 10.84 | 1.70 | 6.41 | 3 | 8.13 | 1.79 | 8.4 |
| 5.8 | 16.05 (6.8°) | 1.81 | 8.21 | 9.6 | 10.70 | 2.20 | 11.3 |

SOLUBILITY IN WATER OF THE THREE ISOMERIC:

(Vaubel — J. pr. Chem. [2] 52, 72, '95.)

Amido Benzo Sulphonic Acids.

| t°. | G. C ₆ H ₄ NH ₂ .SO ₃ H per 100 g. Aq. Sol. | | |
|-----|---|-------|------------|
| | Ortho. | Meta. | Para. |
| 7 | 1.06 | 1.276 | 0.592 (6°) |

Amido Phenols.

| t°. | G. C ₆ H ₃ (OH).NH ₂ per 100 g. Aq. Sol. | | |
|-----|---|-----------|-------|
| | Ortho. | Meta. | Para. |
| 0 | 1.7 | 2.6 (20°) | 1.1 |

Brom, Chlor, and Iodo BENZOIC ACIDS.

SOLUBILITY IN WATER AT 25°.

(Paul — Z. hysik. Chem. 14, 111, '94; Löwenherz — Ibid. 25, 401, '98; Vaubel.)

| Compound. | Formula. | Per 1000 cc. Aqueous Solution. | |
|---------------------|--|--------------------------------|-----------|
| | | Grams. | Gram Mol. |
| Brom benzoic acid. | C ₆ H ₄ Br.COOH (ortho). | 1.856 | 0.00924 |
| Brom benzoic acid. | C ₆ H ₄ Br.COOH (meta). | 0.402 | 0.00200 |
| Brom benzoic acid. | C ₆ H ₄ Br.COOH (para). | 0.056 | 0.00028 |
| Chlor benzoic acid. | C ₆ H ₄ Cl.COOH (ortho). | 2.087 | 0.01333 |
| Iodo benzoic acid. | C ₆ H ₄ I.COOH (ortho). | 0.95 | ... |
| Iodo benzoic acid. | C ₆ H ₄ I.COOH (meta). | 0.12 | ... |

SOLUBILITY OF ORTHO HYDROXY BENZOIC ACID (SALICYLIC ACID), META HYDROXY BENZOIC ACID, AND PARA HYDROXY BENZOIC ACID (ANIS ACID) IN WATER, BENZENE, ETC.

(Walker and Wood — J. Ch. Soc. 73, 622, '98; Vaubel — J. pr. Chem. [2] 52, 73, '95.)

100 gms. aq. solution contain 0.225 gm. $C_6H_4.OH.COOH$ (*o*) at 15° (Vaubel).

100 gms. aq. solution contains 0.794 gm. $C_6H_4.OH.COOH$ (*p*) at 15° (Vaubel).

| t°. | Gms. $C_6H_4.OH.COOH$ per 100 Gms. H_2O . | | Gms. $C_6H_4.OH.COOH$ per 100 Gms. C_6H_6 . | |
|-----|--|-------|--|--------|
| | Meta. | Para. | Meta. | Para. |
| 10 | 0.55 | 0.25 | ... | 0.0018 |
| 20 | 0.90 | 0.50 | 0.008 | 0.0027 |
| 25 | 1.08 | 0.65 | 0.010 | 0.0035 |
| 30 | 1.34 | 0.81 | 0.012 | 0.0045 |
| 35 | 1.64 | 1.01 | 0.015 | 0.0060 |
| 40 | 2.10 | 1.24 | 0.017 | 0.0082 |
| 50 | 3.10 | 2.12 | 0.028 | 0.0162 |
| 60 | ... | ... | 0.047 | 0.028 |
| 80 | ... | ... | ... | 0.066 |

In Acetone.

| t°. | G. $C_6H_4.OH.COOH$ per 100 cc. Sol. | |
|-----|---|-------|
| | Meta. | Para. |
| 23 | 26.0 | 22.7 |

In Ether.

| t°. | G. $C_6H_4.OH.COOH$ per 100 cc. Sol. | |
|-----|---|-------|
| | Meta. | Para. |
| 17 | 9.73 | 9.43 |

Methyl BENZOIC ACIDS $C_6H_4.COOH.CH_3$. *o*, *m*, and *p*.

SOLUBILITY IN WATER.

(Vaubel.)

| t°. | Gms. $C_6H_4.COOH.CH_3$ per 1000 Gms. Sat. Solution. | | |
|-----|--|-------|-------|
| | Ortho. | Meta. | Para. |
| 25° | 1.18 | 0.98 | 0.35 |

Nitro BENZOIC ACIDS $C_6H_4.NO_2.COOH$. *o*, *m*, and *p*.

SOLUBILITY IN SEVERAL SOLVENTS.

(de Coninck — Compt. rend. 118, 471, '94; for solubility in H_2O , see also Paul, Vaubel, Löwenherz, and Goldschmidt — Z. physik. Chem. 25, 95, '96.)

| Solvent. | t°. | Gms. $C_6H_4.NO_2.COOH$ per 100 cc. Solvent. | | |
|--------------------|-----|--|--------------|---------------|
| | | Ortho. | Meta. | Para. |
| Water | 20 | 0.682 (0.654 G.) | 0.315 | 0.039 |
| Water | 25 | 0.743-0.779 | 0.341 | 0.028 |
| Water | 30 | 0.922 | ... | ... |
| Methyl Alcohol | 10 | 42.72 | 47.34 | 9.6 |
| Ethyl Alcohol | 10 | 28.2 | 33.1 (11.7°) | 0.9 |
| Ethyl " (33 Vol.%) | 15 | 0.64 (11.8°) | 0.52 | 0.055 |
| Acetone | 10 | 41.5 | 41.5 | 4.54 |
| Benzene | 10 | 0.294 | 0.795 | 0.017 (12.5°) |
| Carbon Bi-Sulphide | 10 | 0.012 | 0.10 (8.5°) | 0.007 |
| Chloroform | 10 | 0.455 (11.°) | 5.678 | 0.066 |
| Ether | 10 | 21.58 | 25.175 | 2.26 |
| Lignöin | 10 | trace | 0.013 | 0.00 |

SOLUBILITY OF PARA NITRO BENZOIC ACID IN AQUEOUS SOLUTIONS OF ANILIN AND OF PARA TOLUIDIN AT 25°.

(Löwenherz — Z. physik. Chem. 25, 395, '98.)

In Anilin.

| G. Mols. per Liter. | | Gms. per Liter. | |
|---------------------|--------------------|-----------------|--------------------|
| $C_6H_5NH_2$ | $C_6H_4(NO_2)COOH$ | $C_6H_5NH_2$ | $C_6H_4(NO_2)COOH$ |
| 0.0 | 0.00164 | 0.0 | 0.274 |
| 0.01 | 0.00841 | 0.91 | 1.406 |
| 0.02 | 0.01379 | 1.82 | 2.304 |
| 0.04 | 0.02172 | 3.64 | 3.629 |
| 0.08 | 0.0347 | 7.29 | 5.798 |

In *p*-Toluidin.

| G. Mols. per Liter. | | Gms. per Liter. | |
|---------------------|--------------------|-----------------|--------------------|
| $C_6H_5NH_2$ | $C_6H_4(NO_2)COOH$ | $C_6H_5NH_2$ | $C_6H_4(NO_2)COOH$ |
| 0.0 | 0.00164 | 0.0 | 0.274 |
| 0.01 | 0.0100 | 1.071 | 1.671 |
| 0.02 | 0.0174 | 2.142 | 2.902 |
| 0.03 | 0.0245 | 3.213 | 4.097 |

SOLUBILITY OF ORTHO NITRO BENZOIC ACID IN AQUEOUS SOLUTIONS OF SODIUM BUTYRATE, ACETATE, FORMATE, AND SALICYLATE AT 26.4°.

(Philip — J. Chem. Soc. 87, 992, '05.)

Original results in terms of $\frac{\text{Mols.}}{100}$ per liter.

| Gms. Na Salt per Liter. | Gms. Ortho $C_6H_4COOH.NO_2$ per Liter of Solution in: | | | |
|-------------------------|--|-------------|----------|-------------------|
| | C_3H_7COONa | CH_3COONa | $HCOONa$ | $C_6H_4.OH.COONa$ |
| 0 | 7.85 | 7.85 | 7.85 | 7.85 |
| 0.5 | 8.35 | 8.50 | 8.60 | 8.35 |
| 1.0 | 8.90 | 9.15 | 9.50 | 8.70 |
| 2 | 10.0 | 10.80 | 11.5 | 9.4 |
| 3 | 11.2 | 12.55 | 13.5 | 11.0 |
| 4 | 12.4 | 14.5 | 15.6 | 11.5 |
| 6 | 15.2 | ... | ... | ... |

SOLUBILITY OF ORTHO NITRO BENZOIC ACID IN AQUEOUS SOLUTIONS OF DEXTROSE, SODIUM CHLORIDE, AND OF SODIUM NITRATE.

Original results in molecular quantities.

(Hoffman and Langbeck — Z. physik. Chem. 51, 412, '05.)

| In Dextrose. | | | In NaCl. | | | In $NaNO_3$. | | |
|---------------------------------------|--|---------|--------------------------------|--|---------|-----------------------------------|--|---------|
| G. $C_6H_4NO_2$ per 100 cc. Solution. | G. (o) $C_6H_4NO_2.COOH$ per 100 g. Solvent. | | G. NaCl. per 100 cc. Solution. | G. (o) $C_6H_4NO_2.COOH$ per 100 g. Solvent. | | G. $NaNO_3$ per 100 cc. Solution. | G. (o) $C_6H_4NO_2.COOH$ per 100 g. Solvent. | |
| | At 25°. | At 35°. | | At 25°. | At 35°. | | At 25°. | At 35°. |
| 0.0 | 0.736 | 1.063 | 0.117 | 0.743 | 1.072 | 0.170 | 0.746 | 1.074 |
| 0.36 | 0.736 | 1.064 | 0.195 | 0.746 | 1.075 | 0.284 | 0.754 | 1.080 |
| 1.80 | 0.732 | 1.061 | 0.585 | 0.749 | 1.070 | 0.851 | 0.767 | 1.096 |
| 9.50 | 0.722 | 1.051 | 2.425 | 0.688 | 0.967 | 4.255 | 0.774 | 1.097 |
| 20.00 | 0.703 | 1.030 | 5.80 | 0.597 | 0.831 | 8.510 | 0.748 | 1.047 |

BENZOIC SULPHINIDE (Saccharine) $C_6H_4 < \begin{smallmatrix} SO_2 \\ CO \end{smallmatrix} > NH$.

100 parts water dissolve 0.4 part at 25° and 4.17 parts at 100°.
100 parts alcohol dissolve 4 parts at 25° (U. S. P.).

BENZOPHENONE $(C_6H_5)_2CO$.**SOLUBILITY IN AQUEOUS ALCOHOL AND IN OTHER SOLVENTS.**(Derrien — *Compt. rend.* 130, 722, '00; Bell — *J. Physic. Chem.* 9, 550, '05.)**In Aqueous Alcohol at 40°.**

(Bell.)

| Wt. % Alcohol in Solvent. | Gms. $(C_6H_5)_2CO$ per 100 Gms. Solvent. | Solution. | Wt. % Alcohol in Solvent. | Gms. $(C_6H_5)_2CO$ per 100 Gms. Solvent. | Solution. |
|---------------------------------|---|-----------|---------------------------------|---|-----------|
| 40 | 2 | 1.9 | 67.5 | 39 | 28.1 |
| 45 | 5 | 4.8 | 70 | 56 | 35.9 |
| 50 | 8 | 8.3 | 71 | 67 | 39.2 |
| 55 | 11 | 9.9 | 72 | 90 | 47.4 |
| 60 | 16 | 13.8 | 72.5 | 105 | 51.2 |
| 65 | 28 | 22.6 | 73 | 156 | 61.0 |

In Aqueous Alcohol and other Solvents.

(Derrien.)

| Solvent. | t°. | Gms. $(C_6H_5)_2CO$ per 100 g. Solvent. | Solvent. | t°. | Gms. $(C_6H_5)_2CO$ per 100 g. Solvent. |
|------------------------------------|------|---|-------------------|------|--|
| 97% Ethyl Alcohol | 17 | 13.5 | Benzene | 17 | 76.9 |
| 85 cc. 97% Alcohol + 15 cc. H_2O | " | 3.8 | Xylene | 17.6 | 38.4 |
| 80 " " + 20 " | " | 2.2 | Nitro Benzene | 15.8 | 58.8 |
| 75 " " + 26 " | " | 1.3 | Chloroform (com.) | 16.5 | 55.5 |
| Methyl Alcohol (pure) | 9.8 | 11.0 | Bromoform | 17.3 | 33.3 |
| " " | 15.0 | 14.3 | Toluene | 17.2 | 55.5 |
| Acetic Ether (pure) | 9.6 | 19.2 | Ligroïne | 14.6 | 6.7 |
| Carbon Bisulphide | 16.1 | 66.6 | | | |

BERYLLIUM HYDROXIDE $Be(OH)_2$, (See also Glucinium, page 140).**SOLUBILITY IN AQUEOUS SOLUTIONS OF SODIUM HYDROXIDE.**(Rubenbauer — *Z. anorg. Chem.* 30 334, '02.)

Moist $Be(OH)_2$, used, solutions shaken 5 hours, temperature probably about 20°.

| Per 20 cc. Solution. | | Molecular Dilution of the $NaOH$. | Gms. per 100 cc. Solution. | |
|----------------------|-------------|---|----------------------------|--------------|
| Gms. Na . | Gms. Be . | | $NaOH$. | $Be(OH)_2$. |
| 0.3358 | 0.0358 | 1.37 | 2.917 | 0.850 |
| 0.6716 | 0.0882 | 0.68 | 5.840 | 2.094 |
| 0.8725 | 0.1175 | 0.53 | 7.585 | 2.789 |
| 1.7346 | 0.2847 | 0.27 | 18.310 | 6.760 |

BERYLLIUM SULPHATE $BeSO_4$.**SOLUBILITY IN WATER.**(Levi, Malvano — *Z. anorg. Chem.* 48, 446, '06.)

| t°. | Mols. H_2O per 1 Mol. $BeSO_4$. | Gms. $BeSO_4$ per 100 Gms. | | Solid Phase. | t°. | Mols. H_2O per 1 Mol. $BeSO_4$. | Gms. $BeSO_4$ per 100 Gms. | | Solid Phase. |
|------|--|-------------------------------|-----------|----------------------|-------|--|-------------------------------|-----------|----------------------|
| | | Water. | Solution. | | | | Water. | Solution. | |
| 31 | 11.18 | 52.23 | 34.32 | $BeSO_4 \cdot 6H_2O$ | 95.4 | 6.44 | 90.63 | 47.55 | $BeSO_4 \cdot 4H_2O$ |
| 50 | 9.62 | 60.67 | 37.77 | " | 107.2 | 5.06 | 115.3 | 53.58 | " |
| 72.2 | 7.79 | 74.94 | 42.85 | " | 111 | 4.55 | 128.3 | 56.19 | " |
| 77.4 | 7.13 | 81.87 | 45.01 | " | 80 | 6.89 | 84.76 | 45.87 | $BeSO_4 \cdot 2H_2O$ |
| 30 | 13.33 | 43.78 | 30.45 | $BeSO_4 \cdot 4H_2O$ | 91.4 | 5.97 | 97.77 | 49.42 | " |
| 40 | 12.49 | 46.74 | 31.85 | " | 105 | 4.93 | 118.4 | 54.21 | " |
| 68 | 9.42 | 61.95 | 38.27 | " | 119 | 3.91 | 149.3 | 59.88 | " |
| 85 | 7.65 | 76.30 | 43.28 | " | | | | | |

BISMUTH

64

BISMUTH Bi.

MUTUAL SOLUBILITY OF BISMUTH AND ZINC.

(Spring and Romanoff — Z. anorg. Chem. 13, 34, '06.)

| t°. | Upper Layer. | | Lower Layer. | | t°. | Upper Layer. | | Lower Layer. | |
|-----|--------------|------|--------------|------|-----------------------|--------------|------|--------------|------|
| | %Bi. | %Zn. | %Bi. | %Zn. | | %Bi. | %Zn. | %Bi. | %Zn. |
| 266 | 86 | 14 | .. | .. | 584 | 80 | 20 | 10 | 90 |
| 419 | .. | .. | 3 | 97 | 650 | 77 | 23 | 15 | 85 |
| 475 | 84 | 16 | 5 | 95 | 750 | 70 | 30 | 27 | 73 |
| | | | | | 810-820 (crit. temp.) | | | | |

BISMUTH CHLORIDE BiCl₃.

100 grams absolute acetone dissolve 17.9 grams BiCl₃ at 18°.

(Naumann — Ber. 37, 4332, 1904.)

BISMUTH IODIDE BiI₃.

100 grams absolute alcohol dissolve 3.5 grams BiI₃ at 20°.

(Gott and Muir — J. Chem. Soc. 57, 138, '90.)

100 grams methylene iodide CH₂I₂ dissolve 0.15 gram BiI₃ at 12°.

(Retgers — Z. anorg. Chem. 3, 343, '93.)

BISMUTH NITRATE Bi(NO₃)₃·5H₂O.

100 grams acetone dissolve 48.66 grams Bi(NO₃)₃·5H₂O at 0°, and 41.7 grams at 19°.

(von Laszczynski — Ber. 27, 2285, '94.)

BISMUTH OXIDE Bi₂O₃.

SOLUBILITY OF BISMUTH OXIDE IN AQUEOUS NITRIC ACID AT 20°.

(Rutten and van Bemmelen — Z. anorg. Chem. 30, 386, '02.)

| Present in Shaker Flask. | Gms. per 100 Gms. Solution. | | Mols. per 100 Mols. H ₂ O. | | | Solid Phase. |
|--|--------------------------------|-------------------------------|---------------------------------------|-------------------------------|---|---|
| | Bi ₂ O ₃ | N ₂ O ₅ | Bi ₂ O ₃ | N ₂ O ₅ | Ratio Bi ₂ O ₃ : N ₂ O ₅ . | |
| Per 1 part Bi ₂ O ₃ . 3N ₂ O ₅ .10H ₂ O. | | | | | | |
| 24.4 parts H ₂ O | 0.321 | 0.963 | 0.126 | 1.61 | 1:12.8 | Bi ₂ O ₃ .N ₂ O ₅ .2H ₂ O |
| 3.2 parts H ₂ O | 6.37 | 7.17 | 2.844 | 13.82 | 1: 4.8 | |
| Dilute HNO ₃ | 18.74 | 15.9 | 10.50 | 38.65 | 1: 3.6 | Bi ₂ O ₃ .N ₂ O ₅ .H ₂ O |
| Dilute HNO ₃ | 31.48 | 23.7 | 27.2 | 83.8 | 1: 3.0 | |
| Dilute HNO ₃ — 6.13% N ₂ O ₅ | 32.93 | 24.83 | 30.15 | 97.97 | 1: 3.2 | { Bi ₂ O ₃ .N ₂ O ₅ .H ₂ O and Bi ₂ O ₃ .3N ₂ O ₅ .10H ₂ O |
| 6.816% N ₂ O ₅ | 32.67 | 24.70 | 29.70 | 96.57 | 1: 3.2 | |
| 24.0% N ₂ O ₅ | 24.16 | 28.25 | 19.65 | 98.76 | 1: 5.0 | Bi ₂ O ₃ .3N ₂ O ₅ .10H ₂ O |
| 51.0% N ₂ O ₅ | 11.66 | 46.62 | 10.81 | 186.23 | 1:17.2 | |
| 70.0% N ₂ O ₅ | 20.76 | 53.75 | 33.51 | 355.87 | 1:10.6 | { Bi ₂ O ₃ .3N ₂ O ₅ .10H ₂ O and Bi ₂ O ₃ .3N ₂ O ₅ .3H ₂ O |
| | 27.85 | 51.02 | 51.0 | 403.0 | 1: 7.9 | |
| Anyhydrous HNO ₃ | 8.56 | 68.28 | 14.35 | 492.0 | 1:34.3 | Bi ₂ O ₃ .3N ₂ O ₅ .3H ₂ O |
| Bi ₂ O ₃ + " | 4.05 | 74.90 | 7.45 | 592.9 | 1:79.5 | |

Results are also given for 9°, 30°, and 65°.

BORIC ACID (Ortho) H_3BO_3 .

SOLUBILITY IN WATER.

(Ditte — Compt. rend. 85, 1069, 77; Herz and Knoch — Z. anorg. Chem. 41, 319, '04.)

| t°. | Gms. H_3BO_3 per 100 Gms. | | Gms. B_2O_3 per 100 Gms. H_2O . | t°. | Gms. H_3BO_3 per 100 Gms. | | Gms. B_2O_3 per 100 Gms. H_2O . |
|-----|---|-----------|---|-----|---|-----------|---|
| | Water. | Solution. | | | Water. | Solution. | |
| 0 | 1.95 | 1.91 | 1.1 | 40 | 7.0 | 6.54 | 3.95 |
| 10 | 2.70 | 2.63 | 1.5 | 50 | 8.8 | 8.09 | 5.08 |
| 20 | 4.0 | 3.85 | 2.25 | 60 | 11.0 | 9.91 | 6.2 |
| 25 | 4.7 | 4.49 | 2.65 | 80 | 16.8 | 14.38 | 9.5 |
| 30 | 5.4 | 5.12 | 3.05 | 100 | 27.5 | 21.57 | 15.52 |

The above results of Ditte are probably low.

Herz and Knoch find for 13°, 3.845 grams H_3BO_3 per 100 cc. solution, for 20°, 4.909, 25°, 5.593, and 26°, 5.637.Bogdan finds 5.753 grams H_3BO_3 per 100 grams H_2O at 25°.

SOLUBILITY OF BORIC ACID IN AQUEOUS SOLUTIONS OF HYDROCHLORIC, SULPHURIC, AND NITRIC ACIDS AT 26°.

(Herz — Z. anorg. Chem. 33, 355, 34, 205, '03.)

| Normality of the H_2SO_4 , HCl or HNO_3 . | Normality of Dissolved B(OH)_3 . | Gms. Strong Acid per 100 cc. Solution. | Gms. B(OH)_3 per 100 cc. Solution. | | |
|--|---|--|---|------------------------------|---------------------|
| | | | In HCl. | In H_2SO_4 . | In HNO_3 . |
| 0 | 0.91 | 0 | 5.64 | 5.64 | 5.64 |
| 0.5 | 0.78 | 5 | 4.0 | 4.25 | 4.50 |
| 1.0 | 0.71 | 10 | 3.2 | 3.6 | 3.9 |
| 2.0 | 0.58 | 15 | 2.45 | 3.0 | 3.35 |
| 3.0 | 0.49 | 20 | 1.8 | 2.5 | 2.9 |
| 4.0 | 0.41 | 25 | ... | 2.0 | 2.55 |
| 5.0 | 0.35 | 30 | ... | 1.55 | 2.1 |
| 6.0 | 0.26 | 35 | ... | ... | 1.75 |

The determinations given in the original tables in terms of normal solutions when plotted together lay close to an average curve drawn through them. The figures in the tables here shown were read (and calculated) from the average curve.

SOLUBILITY OF BORIC ACID IN AQUEOUS SOLUTIONS OF ELECTROLYTES AT 25°.

(Bogdan — Ann. Scient. Univ. Jassy, 2, 47, '02-'03.)

| Gms. Electrolyte per 100 Gms. H_2O . | Grams H_3BO_3 per 100 Gms. H_2O in Aq. Solutions of: | | | | | |
|--|--|------|-------------------|------------------|----------------------------|---------------------------|
| | NaCl. | KCl. | NaNO_3 . | KNO_3 . | Na_2SO_4 . | K_2SO_4 . |
| 0 | 5.75 | 5.75 | 5.75 | 5.75 | 5.75 | 5.75 |
| 10 | 5.75 | 5.80 | 5.78 | 5.81 | 5.88 | 5.92 |
| 20 | 5.74 | 5.86 | 5.81 | 5.88 | 6.00 | 6.10 |
| 40 | 5.72 | 5.98 | 5.87 | 6.04 | 6.33 | 6.50 |
| 60 | 5.72 | 6.12 | 5.95 | 6.20 | 6.70 | 6.92 |
| 80 | 5.71 | 6.29 | 6.02 | 6.37 | 7.10 | 7.40 |

Interpolated from the original.

100 parts alcohol dissolve 6.5 parts H_3BO_3 at 25° and 23 parts at b. pt. (U. S. P.).

SOLUBILITY OF BORIC ACID IN AQUEOUS SOLUTIONS OF UREA, ACETONE, AND OF PROPYL ALCOHOL AT 25°.

(Bogdan.)

| Grams of $\text{CO}(\text{NH}_2)_2$, $(\text{CH}_3)_2\text{CO}$ or of $\text{C}_3\text{H}_7\text{OH}$ per 100 Gms. H_2O . | Gms. H_3BO_3 per 100 g. H_2O in Aq. Solutions of: | | |
|---|--|----------------------------|---------------------------------|
| | $\text{CO}(\text{NH}_2)_2$ | $(\text{CH}_3)_2\text{CO}$ | $\text{C}_3\text{H}_7\text{OH}$ |
| 0 | 5.75 | 5.75 | 5.75 |
| 10 | 5.84 | 5.84 | 5.80 |
| 20 | 5.93 | 5.93 | 5.85 |
| 40 | 6.13 | 6.12 | 5.94 |
| 60 | 6.31 | 6.29 | 6.03 |

SOLUBILITY OF BORIC ACID IN AQUEOUS SOLUTIONS OF:

Acetic Acid at 26°.

(Herz — Z. anorg. Chem. 34, 205, '03.)

Acetone at 20°.

(Herz and Knoch — *Ibid.* 41, 319, '04.)

| Normality of Solutions. | | Gms. per 100 cc. Solution. | | cc. Acetone per 100 cc. Solvent. | B(OH) ₃ per 100 cc. Solution. | |
|----------------------------|----------------------|----------------------------|----------------------|--|--|--------|
| CH_3COOH . | B(OH) ₃ . | CH_3COOH . | B(OH) ₃ . | | Millimols. | Grams. |
| 0 | 0.91 | 0 | 5.64 | 0 | 79.15 | 4.91 |
| 1 | 0.82 | 5 | 4.7 | 20 | 81.71 | 5.07 |
| 2 | 0.65 | 10 | 4.2 | 30 | 83.35 | 5.17 |
| 4 | 0.42 | 20 | 3.0 | 40 | 82.72 | 5.13 |
| 6 | 0.25 | 30 | 2.0 | 50 | 81.62 | 5.06 |
| | | | | 60 | 76.40 | 4.74 |
| | | | | 70 | 67.62 | 4.19 |
| | | | | 80 | 55.05 | 3.41 |
| | | | | 100 | 8.06 | 0.50 |

SOLUBILITY OF BORIC ACID IN:

Pure Glycerine (Sp.Gr. = 1.260
at 15.5°).Aq. Solutions of Glycerine
at 25°.

(Hooper — Pharm. J. Trans. [3] 13, 258, '82.)

(Herz and Knoch — Z. anorg. Chem. 45, 268, '05.)

| t°. | Gms. B_2O_3 per 100 cc. Glycerine | Gms. B(OH) ₃ per 100 | | Wt. % Glycerine in Solvent. | Millimols B(OH) ₃ per 100 cc. Sol. | Sp. Gr. at 25°. | Gms. B(OH) ₃ per 100 | |
|-----|---|---------------------------------|-----------|-----------------------------------|---|--------------------|------------------------------------|---------------------|
| | | Glycerine. | Solution. | | | | cc. Solution. | Gms. So- lution. |
| 0 | 20 | 15.87 | 13.17 | 0 | 90.1 | 1.017 | 5.59 | 5.50 |
| 10 | 24 | 19.04 | 16.00 | 7.15 | 90.1 | 1.038 | 5.59 | 5.38 |
| 20 | 28 | 22.22 | 18.21 | 20.44 | 90.6 | 1.063 | 5.62 | 5.28 |
| 30 | 33 | 26.19 | 20.75 | 31.55 | 92.9 | 1.090 | 5.76 | 5.29 |
| 40 | 38 | 30.16 | 23.17 | 40.95 | 97.0 | 1.113 | 6.02 | 5.41 |
| 50 | 44 | 34.92 | 25.95 | 48.7 | 103.0 | 1.133 | 6.39 | 5.64 |
| 60 | 50 | 39.68 | 28.41 | 69.2 | 140.2 | 1.187 | 8.69 | 7.32 |
| 70 | 56 | 44.65 | 30.72 | 100.0 | 390.3 | 1.272 | 24.20 | 19.02 |
| 80 | 61 | 48.41 | 32.61 | | | | | |
| 90 | 67 | 53.18 | 34.70 | | | | | |
| 100 | 72 | 57.14 | 36.36 | | | | | |

DISTRIBUTION OF BORIC ACID BETWEEN WATER AND AMYL ALCOHOL
AT 25°.

(Fox — Z. anorg. Chem. 35, 130, '03.)

| Millimols B(OH) ₃ in | | Gms. B(OH) ₃ in 100 cc. | | Millimols B(OH) ₃ in | | Gms. B(OH) ₃ in 100 cc | |
|---------------------------------|------------------|------------------------------------|------------------|---------------------------------|------------------|-----------------------------------|------------------|
| Aq. Layer. | Alcoholic Layer. | Aq. Layer. | Alcoholic Layer. | Aq. Layer. | Alcoholic Layer. | Aq. Layer. | Alcoholic Layer. |
| 265.8 | 76.6 | 1.648 | 0.475 | 87.9 | 33.2 | 0.545 | 0.206 |
| 196.5 | 59.5 | 1.219 | 0.369 | 75.2 | 22.7 | 0.466 | 0.141 |
| 159.6 | 47.5 | 0.990 | 0.294 | 64.6 | 19.76 | 0.400 | 0.123 |
| 126.0 | 37.1 | 0.781 | 0.230 | | | | |

BORIC ACID (Tetra) H₂B₄O₇.100 grams water dissolve 2.69 grams H₂B₄O₇ at 15°, Sp. Gr. = 1.015.

(Gerlach — Z. anal. Chem. 28, 473, '89.)

BORON TRI-FLUORIDE BF₃.1 cc. H₂O absorbs 1.057 cc. BF₃ at 0° and 762 mm., 1 cc. conc. H₂SO₄ (Sp. Gr. 1.85) absorbs 50 cc. BF₃.

BROMINE Br.

SOLUBILITY IN WATER.

(Winkler — Chem. Ztg. 23, 687, '99; Roozeboom — Rec. trav. chim. 3, 29, 59, 73, 84, '84; Dancer — J. Chem. Soc. 15, 477, '62; at 15°, Dietze — Pharm. Ztg. 43, 290, '98.)

| t°. | Grams Bromine per 100 Grams. | | | | "Absorption Coefficient." * | "Solubility." * |
|-----|------------------------------|--------------|-----------|--------------|-----------------------------|-----------------|
| | Water. | | Solution. | | | |
| | (W.) | (R. D. & D.) | (W.) | (R. D. & D.) | | |
| 0 | 4.17 | 4.22 | 3.98 | 4.05 | 60.5 | 43.1 |
| 5 | 3.92 | 3.7 | 3.77 | 3.57 | 45.8 | 32.4 |
| 10 | 3.74 | 3.4 | 3.61 | 3.29 | 35.1 | 24.8 |
| 15 | 3.65 | 3.25 | 3.52 | 3.15 | 27.0 | 19.0 |
| 20 | 3.58 | 3.20 | 3.46 | 3.10 | 21.3 | 14.8 |
| 25 | 3.48 | 3.17 | 3.36 | 3.07 | 17.0 | 11.7 |
| 30 | 3.44 | 3.13 | 3.32 | 3.03 | 13.8 | 9.4 |
| 40 | 3.45 | ... | 3.33 | ... | 9.4 | 6.2 |
| 50 | 3.52 | ... | 3.40 | ... | 6.5 | 4.0 |
| 60 | ... | ... | ... | ... | 4.9 | 2.8 |
| 80 | ... | ... | ... | ... | 3.0 | 1.1 |

* For "Absorption Coefficient" a and "Solubility" g, of Bromine Vapor in water, see Acetylene, page 9.

SOLUBILITY OF BROMINE IN AQUEOUS SOLUTIONS OF POTASSIUM SULPHATE, SODIUM SULPHATE, AND OF SODIUM NITRATE AT 25°.

(Jakowkin — Z. physik. Chem. 20, 38, '96.)

| Normality of Salt Solution. | In K ₂ SO ₄ | | In Na ₂ SO ₄ | | In NaNO ₃ | |
|-----------------------------|-----------------------------------|-------|------------------------------------|-------|----------------------|-------|
| | Gms. per Liter. | | Gms. per Liter. | | Gms. per Liter. | |
| | K ₂ SO ₄ . | Br. | Na ₂ SO ₄ . | Br. | NaNO ₃ . | Br. |
| $\frac{1}{1}$ | 91.18 | 25.14 | 63.55 | 25.07 | 85.09 | 28.80 |
| $\frac{1}{2}$ | 45.59 | 29.44 | 31.77 | 29.20 | 42.54 | 31.35 |
| $\frac{1}{3}$ | 22.79 | 31.46 | 15.88 | 31.33 | 21.27 | 32.62 |
| $\frac{1}{4}$ | 11.39 | 32.70 | 7.94 | 32.94 | 10.63 | 33.33 |
| $\frac{1}{16}$ | 5.69 | 33.10 | 3.97 | 32.26 | 5.31 | 33.74 |

SOLUBILITY OF BROMINE IN NORMAL AQUEOUS SALT SOLUTIONS AT 25°.

(McLauchlan — Z. physik. Chem. 44, 617, '03.)

| Salt. | Gms. Salt per Liter. | Normality of Dissolved Br. | Gms. Br. per Liter. | Salt. | Gms. Salt per Liter. | Normality of Dissolved Br. | Gms. Br. per Liter. |
|---|----------------------|----------------------------|---------------------|------------------------------------|----------------------|----------------------------|---------------------|
| Water | 0.0 | 0.424 | 33.95 | NH ₄ NO ₃ | 80.11 | 0.688 | 55.15 |
| Na ₂ SO ₄ | 63.55 | 0.286 | 23.9 | NaCl | 58.50 | 0.701 | 55.90 |
| K ₂ SO ₄ | 91.18 | 0.310 | 24.8 | KCl | 74.60 | 0.718 | 57.40 |
| (NH ₄) ₂ SO ₄ | 70.04 | 0.971 | 77.7 | NH ₄ Cl | 53.52 | 1.028 | 82.2 |
| NaNO ₃ | 85.09 | 0.3495 | 28.0 | CH ₃ COONH ₄ | 77.09 | 4.26 | 340.5 |
| KNO ₃ | 101.19 | 0.362 | 28.95 | H ₂ SO ₄ * | 49.03 | 0.366 | 29.26 |

* Wildeman.

SOLUBILITY OF BROMINE IN AQUEOUS POTASSIUM BROMIDE SOLUTIONS.

(Worley — J. Chem. Soc. 87, 1107, '05; see also Wildeman — Z. physik. Chem. 11, 421, '93.)

| Gram Mols. KBr per Liter. | Gms. KBr per Liter. | Br. per Liter Dissolved at 26.5°. | | Br. per Liter Dissolved at 18.5°. | |
|---------------------------|---------------------|-----------------------------------|--------|-----------------------------------|--------|
| | | G. Mols. | Grams. | G. Mols. | Grams. |
| 0.00 | 0.00 | 0.4282 | 34.23 | 0.4448 | 35.56 |
| 0.02 | 2.18 | 0.4671 | 37.35 | 0.4823 | 38.56 |
| 0.04 | 4.38 | 0.5101 | 40.79 | 0.5243 | 41.91 |
| 0.06 | 6.55 | 0.5530 | 44.21 | 0.5668 | 45.31 |
| 0.08 | 8.76 | 0.5920 | 47.33 | 0.6059 | 48.44 |
| 0.10 | 10.91 | 0.6488 | 51.87 | 0.6533 | 52.23 |
| 0.20 | 21.82 | 0.8591 | 68.69 | 0.8718 | 69.69 |
| 0.40 | 43.82 | 1.2704 | 101.60 | 1.3124 | 104.90 |
| 0.60 | 65.46 | 1.6717 | 133.70 | 1.7712 | 141.60 |
| 0.80 | 87.64 | 2.1029 | 168.10 | 2.2354 | 178.70 |
| 0.90 | 98.19 | 2.3349 | 186.20 | 2.4851 | 198.70 |

100 grams saturated solution of Bromine in Carbon Bisulphide contain 45.4 grams Br at - 95°, 39.0 grams at - 110.5°, and 36.9 grams at - 116°.

(Arctowski — Z. anorg. Chem. 11, 274, '95-'96.)

DISTRIBUTION OF BROMINE AT 25° BETWEEN WATER AND:

(Jakowkin — Z. physik. Chem. 18, 588, '95.)

| Carbon Bisulphide. | | Bromoform. | | Carbon Tetra Chloride. | |
|------------------------|------------------------|------------------------|--------------------------|------------------------|-------------------------|
| Gms. Br. per Liter of: | | Gms. Br. per Liter of: | | Gms. Br. per Liter of: | |
| Aq. Layer. | CS ₂ Layer. | Aq. Layer. | CHBr ₃ Layer. | Aq. Layer. | CCl ₄ Layer. |
| 0.5 | 36 | 0.5 | 33 | 0.5 | 15 |
| 1 | 80 | 1 | 66 | 1 | 28 |
| 2 | 163 | 2 | 136 | 2 | 60 |
| 3 | 240 | 3 | 206 | 3 | 90 |
| 4 | 330 | 4 | 276 | 4 | 123 |
| 5 | 420 | 5 | 346 | 5 | 156 |
| 6 | 515 | 6 | 415 | 6 | 190 |
| 7 | 620 | ... | ... | 8 | 260 |
| | | | | 10 | 340 |
| | | | | 12 | 430 |
| | | | | 14 | 520 |

BRUCINE C₂₁H₂₀(OCH₃)₂N₂O₂·4H₂O.

SOLUBILITY IN SEVERAL SOLVENTS AT 18°–22°.

(Müller — Apoth. Ztg. 18, 232, '03.)

| Solvent. | Gms. Brucine per 100 Gms. Solution. | Solvent. | Gms. Brucine per 100 Gms. Solution. |
|--------------|---|------------------------|---|
| Water | 0.0563 | Petroleum Ether | 0.088 |
| Ether | 0.749 | Carbon Tetra Chloride | 0.078 |
| Acetic Ether | 4.255 | Carbon Tetra Chloride* | 1.937 |
| Benzene | 1.11 | Glycerine | 2.2 |

* Schindelmeiser — Chem. Ztg. 25, 129, '01.

BUTANE C₄H₁₀.

SOLUBILITY IN WATER AT t°. AND 760 MM.

| t°. | 0° | 4° | 10° | 15° | 20° |
|--|-------|------|-------|-------|-------|
| Vols. C ₄ H ₁₀ per 100 vols. H ₂ O | 3.147 | 2.77 | 2.355 | 2.147 | 2.065 |

Iso **BUTYL ACETATE**, etc.

SOLUBILITY IN WATER.

(Traube — Ber. 17, 2304, '84; at 20°, Vaubel — J. pr. Chem. 59, 30, '99.)

| t°. | Compound. | Grams Com- pound per 100 Grams H ₂ O. |
|-----|-------------------------|--|
| 22 | Iso Butyl Acetate | 0.5 |
| 22 | Iso Butyl Formate | 1.0 |
| 20 | Normal Butyric Aldehyde | 3.6 |
| 20 | Iso Butyric Aldehyde | 10.0 |

BUTYL ACETATE

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SOLUBILITY OF BUTYL ACETATE AND OF BUTYL FORMATE IN MIXTURES OF ALCOHOL AND WATER.

(Bancroft — Calc. from Pfeiffer — Phys. Rev. 3, 205, '95-'96.)

| cc. Alcohol in Mixture. | cc. H ₂ O added to cause separation of a second phase in mixtures of the given quantity of alcohol and 3 cc. portions of: | |
|----------------------------|--|----------------|
| | Butyl Formate. | Butyl Acetate. |
| 3 | 3.45 | 2.08 |
| 6 | 8.83 | 6.08 |
| 9 | 14.75 | 10.46 |
| 12 | 21.45 | 15.37 |
| 15 | 29.65 | 20.42 |
| 18 | 39.0 | 25.60 |
| 21 | 51.8 | 31.49 |
| 24 | ∞ | 37.48 |
| 27 | | 43.75 |
| 30 | | 50.74 |
| 33 | | 59.97 |

100 cc. H₂O dissolve 0.7 cc. iso butyl acetate at 25° (Bancroft).

ISO BUTYRIC ACID (CH₃)₂CH.COOH.

SOLUBILITY IN WATER.

(Rothmund — Z. physik. Chem. 26, 475, '98.)

Synthetic Method used, see Note, p. 9.

| t°. | Gms. Iso Butyric Acid per 100 Gms. | |
|--------------------|------------------------------------|------------------------|
| | Aq. Layer. | Iso Butyric Ac. Layer. |
| 5 | 16.4 | 73.4 |
| 10 | 17.5 | 68.5 |
| 15 | 19.4 | 62.5 |
| 20 | 22.6 | 53.9 |
| 22 | 25.8 | 49.6 |
| 24.7 (crit. temp.) | | 36.3 |

CADMIUM BROMIDE CdBr₂.

SOLUBILITY IN WATER.

(Dietz — Ber. 32, 95, '99; Z. anorg. Chem. 20, 260, '99; Wiss. Abh. p.t. Reichanstalt. 3, 433, '00; see also Eder — Dangler polyt. J. 221, 189, '76; Etard — Ann. chim. phys. [7] 2, 536, '94.)

| t°. | Gms. CdBr ₂ per 100 Gms. Solution. | Mols. CdBr ₂ per 100 Mols. H ₂ O. | Solid Phase. | t°. | Gms. CdBr ₂ per 100 Gms. Solution. | Mols. CdBr ₂ per 100 Mols. H ₂ O. | Solid Phase. |
|-----|---|---|--------------------------------------|-----|---|---|-------------------------------------|
| 0 | 37.92 | 4.04 | CdBr ₂ .4H ₂ O | 40 | 60.65 | 10.20 | CdBr ₂ .H ₂ O |
| 18 | 48.90 | 6.21 | " | 45 | 60.75 | 10.24 | " |
| 30 | 56.90 | 8.73 | " | 60 | 61.10 | 10.39 | " |
| 38 | 61.84 | 10.73 | " | 80 | 62.29 | 10.48 | " |
| 35 | 60.29 | 10.05 | CdBr ₂ .H ₂ O | 100 | 61.63 | 10.63 | " |

Density of saturated solution at 18° = 1.683.

SOLUBILITY OF CADMIUM BROMIDE IN ALCOHOL, ETHER, AND
IN ACETONE.

100 gms. sat. solution of $\text{CdBr}_2 \cdot 4\text{H}_2\text{O}$ in abs. alcohol contain 20.93 gms. CdBr_2 at 15° (Eder).

100 gms. sat. solution of $\text{CdBr}_2 \cdot 4\text{H}_2\text{O}$ in abs. ether contain 0.4 gm. CdBr_2 at 15° (Eder).

100 gms. absolute acetone dissolve 1.559 gms. CdBr_2 at 18° .

(Naumann — Ber. 37, 4332, '04.)

CADMIUM (Mono) AMMONIUM BROMIDE $\text{CdBr}_2 \cdot \text{NH}_4\text{Br}$.

SOLUBILITY IN WATER.

(Rimbach — Ber. 38, 1553, '05; Eder.)

| t°. | 100 Grams Solution contain Gms. | | | Atomic Relation. | | | G. $\text{CdBr}_2 \cdot \text{NH}_4\text{Br}$ per 100 Gms. Solution. |
|-------|---------------------------------|-------|-----------------|------------------|----|-----------------|--|
| | Cd. | Br. | NH_4 . | Cd | Br | NH_4 . | |
| 1.0 | 16.33 | 34.87 | 2.63 | 1 | 3 | 1 | 53.82 |
| 14.8 | 17.40 | 37.15 | 2.80 | 1 | 3 | 1 | 58.01 |
| 52.2 | 19.79 | 42.38 | 3.21 | 1 | 3 | 1 | 65.31 |
| 110.1 | 22.99 | 49.17 | 3.72 | 1 | 3 | 1 | 75.98 |

100 gms. sat. solution of $\text{CdBr}_2 \cdot \text{NH}_4\text{Br}$ in abs. alcohol contain 15.8 gms. double salt at 15° (Eder).

100 gms. sat. solution of $\text{CdBr}_2 \cdot \text{NH}_4\text{Br}$ in abs. ether contain 0.36 gm. double salt at 15° (Eder).

CADMIUM (Tetra) AMMONIUM BROMIDE $\text{CdBr}_2 \cdot 4\text{NH}_4\text{Br}$.

SOLUBILITY IN WATER.

(Rimbach.)

The double salt is decomposed by water at temperatures below 160° .

| t°. | 100 Gms. Solution contain Gms. | | | Atomic Relation in Sol. | | | Atomic Relation in Solid. | | |
|-------|--------------------------------|-------|-----------------|-------------------------|------|-----------------|---------------------------|-------|-----------------|
| | Cd. | Br. | NH_4 . | Cd | Br | NH_4 . | Cd | Br | NH_4 . |
| 0.8 | 14.72 | 50.46 | 6.67 | 1 | 4.82 | 2.82 | 1 | 10.02 | 8.02 |
| 13.0 | 14.95 | 51.48 | 6.85 | 1 | 4.85 | 2.85 | 1 | 11.57 | 9.57 |
| 44.0 | 15.01 | 53.85 | 7.35 | 1 | 5.04 | 3.04 | 1 | 6.84 | 4.84 |
| 76.4 | 14.6 | 54.28 | 7.80 | 1 | 5.32 | 3.32 | 1 | 6.63 | 4.63 |
| 123.5 | 15.5 | 59.50 | 8.45 | 1 | 5.38 | 3.38 | 1 | 7.40 | 5.40 |
| 160.0 | 14.7 | 62.67 | 9.43 | 1 | 5.99 | 3.99 | 1 | 6.03 | 4.03 |

CADMIUM (Mono) POTASSIUM BROMIDE $\text{CdBr}_2 \cdot \text{KBr} \cdot \text{H}_2\text{O}$.

SOLUBILITY IN WATER.

(Rimbach; see also Eder.)

| t°. | 100 Gms. Solution contain Gms. | | | Atomic Relation in Sol. | | | Gms. $\text{CdBr}_2 \cdot \text{KBr}$ per 100 Gms. Solution. |
|-------|--------------------------------|-------|------|-------------------------|----|------|--|
| | Cd. | Br. | K. | Cd | Br | K. | |
| 0.4 | 15.41 | 33.0 | 5.42 | 1 | 3 | 1 | 53.63 |
| 15.8 | 16.85 | 35.96 | 5.86 | 1 | 3 | 1 | 58.61 |
| 50.0 | 19.58 | 41.86 | 6.85 | 1 | 3 | 1 | 67.87 |
| 112.5 | 22.24 | 48.28 | 8.14 | 0.98 | 3 | 1.03 | 78.11 |

CADMIUM Tetra POTASSIUM BROMIDE is decomposed by water at ordinary temperatures.

CADMIUM (Mono) RHUBIDIUM BROMIDE $\text{CdBr}_2 \cdot \text{RbBr}$.

SOLUBILITY IN WATER.

(Rimbach.)

| t°. | 100 Gms. Solution contain Gms. | | | Atomic Relation in Sol. | | | Gms. $\text{CdBr}_2 \cdot \text{RbBr}$ per 100 Gms. Solution. |
|-------|--------------------------------|-------|-------|-------------------------|----|------|---|
| | Cd. | Br. | Rb. | Cd | Br | Rb. | |
| 0.4 | 8.37 | 17.93 | 6.43 | 1 | 3 | 1.01 | 32.65 |
| 14.5 | 10.72 | 23.02 | 8.30 | 0.99 | 3 | 1.01 | 41.87 |
| 49.2 | 15.01 | 32.13 | 11.51 | 1 | 3 | 1 | 58.54 |
| 107.5 | 19.65 | 41.12 | 14.06 | 1.02 | 3 | 0.96 | 75.77 |

CADMIUM (Tetra) RHUBIDIUM BROMIDE $\text{CdBr}_2 \cdot 4\text{RbBr}$.

SOLUBILITY IN WATER.

(Rimbach.)

| t°. | 100 Gms. Solution contain Gms. | | | Atomic Relation in Sol. | | | Gms. $\text{CdBr}_2 \cdot 4\text{RbBr}$ per 100 Gms. Solution. |
|-------|--------------------------------|-------|-------|-------------------------|----|------|--|
| | Cd | Br | Rb. | Cd | Br | Rb. | |
| 0.5 | 5.70 | 24.94 | 17.97 | 0.98 | 6 | 4.05 | 47.95 |
| 13.5 | 6.55 | 28.74 | 20.74 | 0.97 | 6 | 4.05 | 55.17 |
| 51.5 | 8.25 | 35.51 | 25.39 | 0.99 | 6 | 4.02 | 68.82 |
| 114.5 | 9.50 | 40.67 | 29.00 | 1.00 | 6 | 4.0 | 79.04 |

CADMIUM (Mono) SODIUM BROMIDE $\text{CdBr}_2 \cdot \text{NaBr} \frac{1}{2} \text{H}_2\text{O}$.

SOLUBILITY IN WATER, ETC., AT 15°.

(Eder — Ding. polyt. J. 221, 189, '76.)

| Solvent. | Gms. $\text{CdBr}_2 \cdot \text{NaBr}$ per 100 Gms. | | Solid Phase. |
|------------------|---|----------|--|
| | Solution. | Solvent. | |
| Water | 49.0 | 96.1 | $\text{CdBr}_2 \cdot \text{NaBr} \cdot \frac{1}{2} \text{H}_2\text{O}$ |
| Absolute Alcohol | 21.2 | 27.0 | " |
| Absolute Ether | 0.52 | 0.53 | " |

CADMIUM CHLORATE $\text{Cd}(\text{ClO}_3)_2 \cdot 2\text{H}_2\text{O}$.

SOLUBILITY IN WATER.

(Meusser — Ber. 35, 1422, '02.)

| t°. | Gms. $\text{Cd}(\text{ClO}_3)_2$ per 100 Gms. Solution. | Mols. $\text{Cd}(\text{ClO}_3)_2$ per 100 Mols. H_2O . | Solid Phase. | t°. | Gms. $\text{Cd}(\text{ClO}_3)_2$ per 100 Gms. Solution. | Mols. $\text{Cd}(\text{ClO}_3)_2$ per 100 Mols. H_2O . | Solid Phase. |
|-----|---|--|---|-----|---|--|---|
| | | | | | | | |
| -20 | 72.18 | 22.47 | $\text{Cd}(\text{ClO}_3)_2 \cdot 2\text{H}_2\text{O}$ | 18 | 76.36 | 27.98 | $\text{Cd}(\text{ClO}_3)_2 \cdot 2\text{H}_2\text{O}$ |
| -15 | 72.53 | 22.87 | " | 49 | 80.08 | 34.82 | " |
| 0 | 74.95 | 25.92 | " | 65 | 82.95 | 42.14 | " |

Density of the saturated solution at 18° = 2.284.

SOLUBILITY IN WATER.

(Dietz — W. Abh. p. t. Reichenstalt 3, 433, '00; above 100°, Etard — Ann. chim. phys. [7] 2, 536, '94.)

| t°. | G. CdCl ₂ per 100 Gms. Solution. | Mols. CdCl ₂ per 100 Mols. H ₂ O. | Solid Phase. | t°. | G. CdCl ₂ per 100 Gms. Solution. | Mols. CdCl ₂ per 100 Mols. H ₂ O. | Solid Phase. |
|------|---|---|---|------|---|---|-------------------------------------|
| - 9 | 43.58 | 7.5 | CdCl ₂ ·4H ₂ O | + 10 | 57.47 | 13.3 | CdCl ₂ ·H ₂ O |
| 0 | 49.39 | 9.6 | | 20 | 57.35 | 13.2 | |
| + 10 | 55.58 | 12.3 | | 40 | 57.51 | 13.3 | |
| 15 | 59.12 | 14.2 | | 60 | 57.71 | 13.4 | |
| - 10 | 44.35 | 7.8 | CdCl ₂ ·2½H ₂ O (monoclinic) | 80 | 58.41 | 13.8 | |
| 0 | 47.37 | 9.0 | | 100 | 59.52 | 14.4 | |
| + 18 | 52.53 | 10.9 | | 150 | 64.8 | | |
| 30 | 56.91 | 12.8 | | 200 | 72.0 | | |
| 36 | 57.91 | 13.5 | | 270 | 77.7 | | |

Density of saturated solution at 18° = 1.741.

100 gms. abs. ethyl alcohol dissolve 1.52 gms. CdCl₂ at 15°.5.100 gms. abs. methyl alcohol dissolve 1.71 gms. CdCl₂ at 15°.5.

(de Bruyn — Z. physik. Chem. 10, 783, '92.)

CADMIUM AMMONIUM CHLORIDE CdCl₂·NH₄Cl.

SOLUBILITY IN WATER.

(Rimbach — Ber. 30, 3075, 1897.)

| t°. | 100 Gms. Solution contain Gms. | | | Gms. CdCl ₂ ·NH ₄ Cl per 100 Gms. | |
|-------|--------------------------------|-------|-------------------|---|--------|
| | Cd. | Cl. | NH ₄ . | Solution. | Water. |
| 2.4 | 14.26 | 13.44 | 2.24 | 29.94 | 42.74 |
| 16.0 | 15.82 | 15.07 | 2.56 | 33.45 | 50.26 |
| 41.2 | 18.61 | 17.46 | 2.89 | 38.96 | 63.83 |
| 63.8 | 20.92 | 19.73 | 3.34 | 43.99 | 78.54 |
| 105.9 | 24.70 | 23.52 | 4.01 | 52.23 | 109.33 |

CADMIUM (Tetra) AMMONIUM CHLORIDE CdCl₂·4NH₄Cl.

IN CONTACT WITH WATER.

The salt is decomposed in aqueous solution.

(Rimbach.)

| t°. | 100 Gms. Solution contain Gms. | | | Atomic Relation in Solution. | | |
|-------|--------------------------------|-------|-------------------|------------------------------|------|-------------------|
| | Cd. | Cl. | NH ₄ . | Cd | Cl | NH ₄ . |
| 3.9 | 5.75 | 18.17 | 7.37 | 1 | 9.96 | 7.96 |
| 16.1 | 6.96 | 20.26 | 7.97 | 1 | 9.20 | 7.13 |
| 40.2 | 9.91 | 23.84 | 8.92 | 1 | 7.61 | 5.61 |
| 58.5 | 12.50 | 26.53 | 9.35 | 1 | 6.71 | 4.66 |
| 112.9 | 16.66 | 31.79 | 10.78 | 1 | 6.02 | 4.02 |
| 113.9 | 16.51 | 32.71 | 11.30 | 1 | 6.26 | 4.26 |

SOLUBILITY OF MIXTURES OF CADMIUM TETRA AMMONIUM CHLORIDE AND CADMIUM AMMONIUM CHLORIDE IN WATER.

(Rimbach — Ber. 35, 1300, '02.)

| t°. | 100 Gms. Solution contain Gms. | | | Atomic Relation. | | | Solid Phase, Mol. per cent of: | |
|------|--------------------------------|-------|-------------------|------------------|-------|-------------------|--|---|
| | Cd. | Cl. | NH ₄ . | Cd | Cl | NH ₄ . | CdCl ₂ ·NH ₄ Cl. | CdCl ₂ ·4NH ₄ Cl. |
| 1.1 | 5.34 | 17.62 | 7.27 | 1 | 10.47 | 8.50 | 49.6 | 50.4 |
| 14.0 | 7.12 | 19.86 | 7.84 | 1 | 8.84 | 6.87 | 47.0 | 53.0 |
| 40.7 | 10.24 | 23.82 | 8.85 | 1 | 7.37 | 5.37 | 77.0 | 23.0 |
| 58.5 | 12.50 | 26.53 | 9.35 | 1 | 6.71 | 4.66 | ... | ... |

CADMIUM CHLORIDE

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SOLUBILITY OF MIXTURES OF CADMIUM TETRA AMMONIUM CHLORIDE AND AMMONIUM CHLORIDE IN WATER.

(Rimbach.)

| t°. | 100 Gms. Solution contain Gms. | | | Atomic Relation. | | | Solid Phase, Mol. per cent of: | |
|------|-----------------------------------|-------|-------|---------------------|-------|-------------------|-----------------------------------|---|
| | Cd. | Cl. | NH. | Cd | Cl | NH ₄ . | NH ₄ Cl. | CdCl ₂ ·4NH ₄ Cl. |
| 1.0 | 2.82 | 17.11 | 7.82 | 1 | 19.21 | 17.28 | 59.0 | 41.0 |
| 13.2 | 2.76 | 18.84 | 8.71 | 1 | 21.62 | 19.62 | 74.0 | 26.0 |
| 40.1 | 3.16 | 22.56 | 10.49 | 1 | 22.65 | 20.74 | 71.0 | 29.0 |
| 58.2 | 3.51 | 25.21 | 11.72 | 1 | 22.79 | 20.89 | 69.0 | 31.0 |

CADMIUM BARIUM CHLORIDE 2(CdCl₂).BaCl₂.5H₂O.

SOLUBILITY IN WATER.

(Rimbach — Ber. 30, 3083, '97.)

| t°. | 100 Gms. Solution contain Gms. | | | Gms. 2(CdCl ₂).BaCl ₂ per 100 Gms. | |
|-------|-----------------------------------|-------|-------|--|--------|
| | Cd. | Cl. | Ba. | Solution. | Water. |
| 22.6 | 17.71 | 16.89 | 11.0 | 45.60 | 83.82 |
| 41.3 | 19.22 | 18.15 | 11.77 | 49.14 | 96.62 |
| 53.9 | 19.85 | 18.75 | 12.41 | 51.04 | 104.25 |
| 62.2 | 20.59 | 19.66 | 12.83 | 53.08 | 113.13 |
| 69.5 | 21.20 | 20.18 | 13.09 | 54.47 | 119.64 |
| 107.2 | 24.25 | 23.23 | 14.90 | 62.38 | 165.85 |

CADMIUM BARIUM CHLORIDE CdCl₂.BaCl₂.4H₂O.

SOLUBILITY IN WATER.

(Rimbach.)

| t°. | 100 Gms. Solution contain Gms. | | | Gms. CdCl ₂ .BaCl ₂ per 100 Gms. | |
|-------|-----------------------------------|-------|-------|---|--------|
| | Cd. | Cl. | Ba. | Solution. | Water. |
| 22.5 | 11.98 | 15.19 | 14.71 | 41.88 | 72.06 |
| 32.9 | 12.40 | 16.18 | 16.09 | 44.67 | 80.73 |
| 41.4 | 13.05 | 16.95 | 16.81 | 46.81 | 88.01 |
| 53.4 | 13.96 | 18.21 | 18.13 | 50.30 | 101.21 |
| 62.0 | 14.73 | 18.81 | 18.74 | 52.28 | 109.56 |
| 97.8 | 17.57 | 22.48 | 22.00 | 62.05 | 163.50 |
| 108.3 | 18.53 | 23.51 | 22.79 | 64.83 | 184.33 |
| 109.2 | 18.67 | 23.69 | 29.95 | 65.31 | 188.27 |

CADMIUM MAGNESIUM CHLORIDE 2(CdCl₂).MgCl₂.12H₂O.

SOLUBILITY IN WATER.

(Rimbach.)

| t°. | 100 Gms. Solution contain Gms. | | | Gms. 2(CdCl ₂).MgCl ₂ per 100 Gms. | |
|-------|-----------------------------------|-------|------|--|--------|
| | Cd. | Cl. | Mg. | Solution. | Water. |
| 2.4 | 22.14 | 21.06 | 2.41 | 45.61 | 83.86 |
| 20.8 | 24.30 | 22.80 | 2.55 | 49.69 | 98.77 |
| 45.5 | 26.24 | 24.55 | 2.72 | 53.51 | 115.10 |
| 67.2 | 28.45 | 26.71 | 2.98 | 58.14 | 138.90 |
| 121.8 | 31.84 | 30.20 | 3.44 | 65.48 | 189.69 |

CADMIUM (Mono) RHUBIDIUM CHLORIDE $\text{CdCl}_2 \cdot \text{RbCl}$.

SOLUBILITY OF CADMIUM MONO RHUBIDIUM CHLORIDE IN WATER.
(Rimbach — Ber. 35, 1303, '02.)

| t°. | 100 Gms. Solution contain Gms. | | | Gms. $\text{CdCl}_2 \cdot \text{RbCl}$ per 100 Gms. | |
|-------|--------------------------------|-------|-------|---|--------|
| | Cd. | Cl. | Rb. | Solution. | Water. |
| 1.2 | 4.80 | 4.53 | 3.63 | 12.97 | 14.90 |
| 14.5 | 6.20 | 5.88 | 4.75 | 16.80 | 20.19 |
| 41.4 | 9.34 | 8.86 | 7.14 | 25.31 | 33.89 |
| 57.6 | 11.40 | 10.78 | 8.63 | 30.83 | 44.58 |
| 103.9 | 17.14 | 16.37 | 13.39 | 46.62 | 87.36 |

CADMIUM (Tetra) RHUBIDIUM CHLORIDE $\text{CdCl}_2 \cdot 4\text{RbCl}$.

IN CONTACT WITH WATER.
(Rimbach.)

The double salt decomposes to $\text{CdCl}_2 \cdot \text{RbCl}$ and RbCl .

| t°. | 100 Gms. Solution contain Gms. | | | Atomic Relation. | | | Solid Phase, Mol. per cent of: | |
|-------|--------------------------------|-------|-------|------------------|-------|-------|-----------------------------------|------------------------------------|
| | Cd. | Cl. | Rb. | Cd | Cl | Rb. | $\text{CdCl}_2 \cdot \text{RbCl}$ | $\text{CdCl}_2 \cdot 4\text{RbCl}$ |
| 0.7 | 0.65 | 6.52 | 14.73 | 1 | 31.88 | 29.88 | 30 | 70 |
| 8.8 | 1.07 | 7.37 | 16.13 | 1 | 21.89 | 19.89 | 24 | 76 |
| 13.8 | 1.32 | 7.86 | 16.93 | 1 | 18.88 | 16.83 | 16 | 84 |
| 42.4 | 3.21 | 11.35 | 22.45 | 1 | 11.21 | 9.21 | 14 | 86 |
| 59.0 | 4.61 | 13.41 | 25.31 | 1 | 9.23 | 7.23 | 33 | 67 |
| 108.4 | 8.94 | 18.57 | 31.15 | 1 | 6.57 | 4.59 | .. | .. |

SOLUBILITY OF MIXTURES OF $\text{CdCl}_2 \cdot 4\text{RbCl}$ AND RbCl IN WATER.
(Rimbach.)

| t°. | 100 Gms. Solution contain Gms. | | | Atomic Relation. | | | Solid Phase, Mol. per cent of: | |
|------|--------------------------------|-------|-------|------------------|----|-----|------------------------------------|---------------|
| | Cd. | Cl. | Rb. | Cd | Cl | Rb. | $\text{CdCl}_2 \cdot 4\text{RbCl}$ | RbCl |
| 0.4 | .. | 12.86 | 30.97 | .. | 1 | 1 | 55 | 45 |
| 14.8 | .. | 13.62 | 32.81 | .. | 1 | 1 | 67 | 33 |
| 17.9 | .. | 14.0 | 33.71 | .. | 1 | 1 | 80 | 20 |

THE EFFECT OF THE PRESENCE OF HCl , CaCl_2 , AND OF LiCl UPON
THE DECOMPOSITION OF CADMIUM TETRA RHUBIDIUM
CHLORIDE BY WATER AT 16°.

(Rimbach — Ber. 38, 1570, '05.)

| 100 Gms. Solution contain Gms. | | | | | Mols. per 100 Mols. H_2O . | | | Molecular Ratio. | |
|--------------------------------|------|-------------------|------|-------|--|-----------------|-------------------|------------------|-----------------|
| Total Cl. | Cl. | HCl . | Cd. | Rb. | CdCl_2 . | RbCl . | HCl . | CdCl_2 | RbCl . |
| 36.44 | 0.84 | 36.61 | 0.41 | 1.39 | 0.109 | 0.483 | 29.76 | 1 | 4.43 |
| 28.45 | 0.80 | 28.44 | 0.35 | 1.38 | 0.082 | 0.422 | 20.35 | 1 | 5.15 |
| 12.09 | 3.24 | 9.11 | 0.69 | 6.74 | 0.139 | 1.772 | 5.60 | 1 | 12.75 |
| | Ca. | CaCl_2 . | | | | | CaCl_2 . | | |
| 14.98 | 7.56 | 20.91 | 0.73 | 2.80 | 0.159 | 0.799 | 4.59 | 1 | 5.04 |
| 12.70 | 5.77 | 15.96 | 0.77 | 4.87 | 0.163 | 1.353 | 3.41 | 1 | 8.31 |
| 10.85 | 3.78 | 14.47 | 1.00 | 8.51 | 0.211 | 2.365 | 2.24 | 1 | 11.22 |
| 9.08 | 1.84 | 5.10 | 1.24 | 12.14 | 0.262 | 3.385 | 1.09 | 1 | 12.92 |
| | Li. | LiCl . | | | | | LiCl . | | |
| 26.49 | 4.87 | 29.40 | 0.56 | 3.871 | 0.139 | 1.271 | 19.40 | 1 | 9.13 |
| 20.37 | 3.33 | 20.11 | 0.52 | 7.84 | 0.122 | 2.433 | 12.54 | 1 | 19.88 |

See Note on next page.

CADMIUM CHLORIDE

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CADMIUM (Mono) POTASSIUM CHLORIDE $\text{CdCl}_2 \cdot \text{KCl} \cdot \text{H}_2\text{O}$.

SOLUBILITY IN WATER.

(Rimbach — Ber. 30, 3079, '97; see also Croft — Phil. Mag. [3] 21, 356, '42.)

| t°. | 100 Gms. Solution contain Gms. | | | Gms. $\text{CdCl}_2 \cdot \text{KCl}$ per 100 Gms. | |
|-------|--------------------------------|-------|------|--|--------|
| | Cd. | Cl. | K. | Solution. | Water. |
| 2.6 | 9.53 | 9.03 | 3.31 | 21.87 | 27.99 |
| 15.9 | 11.63 | 10.98 | 3.99 | 26.60 | 36.24 |
| 41.5 | 15.47 | 14.73 | 5.45 | 35.66 | 55.34 |
| 60.6 | 17.68 | 16.80 | 6.20 | 40.67 | 68.55 |
| 105.1 | 22.46 | 21.34 | 7.87 | 51.67 | 106.91 |

CADMIUM (Tetra) POTASSIUM CHLORIDE $\text{CdCl}_2 \cdot 4\text{KCl}$.

IN CONTACT WITH WATER.

(Rimbach.)

The double salt is decomposed when dissolved in water at ordinary temperature.

| t°. | 100 Grams Solution contain Gms. | | |
|-------|---------------------------------|-------|-------|
| | Cd. | Cl. | K. |
| 4 | 3.64 | 9.84 | 8.31 |
| 23.6 | 5.66 | 14.02 | 11.52 |
| 50.2 | 9.10 | 18.09 | 13.60 |
| 108.9 | 11.94 | 23.11 | 17.16 |

NOTE. — The effect of the presence of certain chlorides upon the decomposition of cadmium tetra potassium chloride by water at 16° was investigated by Rimbach in a manner similar to that used in the case of cadmium tetra rubidium chloride (see preceding page). The results, which show the extent to which increasing amounts of the several chlorides force back the decomposition of the double salt, were plotted on cross-section paper, and the points at which the decomposition was prevented, were determined by interpolation. These values which show the minimum amount of the added chlorides which must be present to insure the crystallization of the pure double salt are shown in the following table.

| Added Chloride. | Mols. per 100 Mols. H_2O . | | | Density of Solutions. | Mols. per Liter of Solution. | | |
|-----------------|--|--------|-----------------|-----------------------|------------------------------|--------|-----------------|
| | CdCl_2 . | KCl. | Added Chloride. | | CdCl_2 . | KCl. | Added Chloride. |
| HCl | 0.074 | 0.296 | 19.80 | 1.1403 | 0.033 | 0.132 | 8.828 |
| LiCl | 0.344 | 1.376 | 9.30 | 1.1380 | 0.166 | 0.663 | 4.483 |
| CaCl_2 | 0.544 | 2.176 | 3.80 | 1.2333 | 0.270 | 1.808 | 1.887 |
| KCl | 1.034 | 6.514* | 2.378 | 1.214 | 0.507 | 3.195* | 1.167 |

* Total.

CADMIUM CYANIDE $\text{Cd}(\text{CN})_2$.

100 gms. H_2O dissolve 1.7 gms. $\text{Cd}(\text{CN})_2$ at 15°.

(Joannis — Ann. chim. phys. [5] 26, 480, '82.)

CADMIUM FLUORIDE CdF_2 .

SOLUBILITY IN WATER.

100 cc. saturated aqueous solution contain 4.36 gms. CdF_2 at 25° .

(Jager — Z. anorg. Chem. 27, 34, '01.)

CADMIUM HYDROXIDE $\text{Cd}(\text{OH})_2$.

SOLUBILITY IN WATER.

1 liter of aqueous solution contains 0.0026 gm. $\text{Cd}(\text{OH})_2$ at 25° .

(Bodländer — Z. physik. Chem. 27, 66, '98.)

CADMIUM IODIDE CdI_2 .

SOLUBILITY IN WATER.

(Dietz — W. Abh. p. t. Reichanstalt 3, 433, '00; see also Kremers — Pogg. Ann. 103, 57, '58; Eder — Dingl. polyt. J. 221, 189, '76; Etard — Ann. chim. phys. [7] 2, 536, '94.)

| t° . | Gms. CdI_2 per 100 Gms. | | Mols. CdI_2 per 100 Mols. H_2O . | t° . | Gms. CdI_2 per 100 Gms. | | Mols. CdI_2 per 100 Mols. H_2O . |
|-------------|----------------------------------|--------|---|-------------|----------------------------------|--------|---|
| | Solution. | Water. | | | Solution. | Water. | |
| 0 | 44.4 | 79.8 | 3.9 | 30 | 47.3 | 89.7 | 4.43 |
| 10 | 45.4 | 83.2 | 4.1 | 40 | 48.4 | 93.8 | 4.6 |
| 15 | 45.8 | 84.5 | 4.17 | 50 | 49.35 | 97.4 | 4.8 |
| 18 | 46.02 | 85.2 | 4.2 | 75 | 52.65 | 111.2 | 5.4 |
| 20 | 46.3 | 86.2 | 4.26 | 100 | 56.08 | 127.6 | 6.3 |
| 25 | 46.8 | 87.9 | 4.34 | | | | |

Density of saturated solution at $18^\circ = 1.590$.

SOLUBILITY OF CADMIUM IODIDE IN ORGANIC SOLVENTS.

| Solvent. | t° . | Gms. CdI_2 per 100 Gms. | | Observer. |
|------------------|-------------|-------------------------------------|----------|--|
| | | Solution. | Solvent. | |
| Absolute Alcohol | 15 | 50.5 | 102.0 | (Eder.) |
| Ethyl Alcohol | 20 | 42.6 | 74.27 | (Timofeiew — Compt. rend. 112, 1224, '91.) |
| Methyl Alcohol | 20 | 59.0 | 143.7 | (Timofeiew — Compt. rend. 112, 1224, '91.) |
| Propyl Alcohol | 20 | 28.9 | 40.67 | (Timofeiew — Compt. rend. 112, 1224, '91.) |
| Absolute Ether | 15 | 21.7 | 27.7 | (Eder.) |
| Absolute Acetone | 18 | 20.0 | 25.0 | (Naumann — Ber. 37, 4332, '04.) |

CADMIUM AMMONIUM IODIDES (Mono and Di).

SOLUBILITY IN WATER, ETC.

(Rimbach — Ber. 38, 1557, '05; at 15° Eder — Dingl. polyt. J. 221, 189, '76.)

| Solvent. | t°. | Cd. Mono Ammonium Iodide. | | t°. | Cd. Di Ammonium Iodide. | |
|--------------|-----|--|----------|------|---|----------|
| | | Gms. CdI ₂ .NH ₄ I per 100 Gms. | | | Gms. CdI ₂ .2NH ₄ I per 100 Gms. | |
| | | Solution. | Solvent. | | Solution. | Solvent. |
| Water | 15 | 52.6 | 111.0 | 14.5 | 85.97 | 611.6 |
| Abs. Alcohol | 15 | 53 | 113 | 15 | 59 | 143 |
| Abs. Ether | 15 | 29.4 | 41.7 | 15 | 10 | 11 |

CADMIUM IODIDES

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CADMIUM POTASSIUM IODIDES, Mono = $\text{CdI}_2 \cdot \text{KI} \cdot \text{H}_2\text{O}$,
Di = $\text{CdI}_2 \cdot 2\text{KI} \cdot 2\text{H}_2\text{O}$.

CADMIUM Di SODIUM IODIDE $\text{CdI}_2 \cdot 2\text{NaI} \cdot 6\text{H}_2\text{O}$.

SOLUBILITY IN WATER, ETC., AT 15° .

(Eder.)

| Solvent. | Gms. $\text{CdI}_2 \cdot \text{KI}$ per 100 Gms. | | Gms. $\text{CdI}_2 \cdot 2\text{KI}$ per 100 Gms. | | Gms. $\text{CdI}_2 \cdot 2\text{NaI}$ per 100 Gms. | |
|--------------|---|----------|--|----------|---|----------|
| | Solution. | Solvent. | Solution. | Solvent. | Solution. | Solvent. |
| Water | 51.5 | 106 | 57.8 | 137 | 61.3 | 158.8 |
| Abs. Alcohol | ... | ... | 41.7 | 71 | 53.7 | 116.2 |
| Abs. Ether | ... | ... | 3.9 | 4.1 | 9.0 | 9.9 |

CADMIUM NITRATE $\text{Cd}(\text{NO}_3)_2$.

SOLUBILITY IN WATER.

(Funk — Wiss. Abb. p. t. Reichenstalt 3 440, '00.)

| t °. | Gms. $\text{Cd}(\text{NO}_3)_2$ per 100 Gms. | | Mols. $\text{Cd}(\text{NO}_3)_2$ per 100 Mols. H_2O . | Solid Phase. |
|------|---|--------|--|--|
| | Solution. | Water. | | |
| -13 | 37.37 | 59.67 | 4.55 | $\text{Cd}(\text{NO}_3)_2 \cdot 9\text{H}_2\text{O}$ |
| -1 | 47.33 | 89.86 | 6.85 | " |
| +1 | 52.73 | 111.5 | 8.50 | " |
| 0 | 52.37 | 109.7 | 8.37 | $\text{Cd}(\text{NO}_3)_2 \cdot 4\text{H}_2\text{O}$ |
| +18 | 55.9 | 126.8 | 9.61 | " |
| 30 | 58.4 | 140.4 | 10.7 | " |
| 40 | 61.42 | 159.2 | 12.1 | " |
| 59.5 | 76.54 | 326.3 | 25.0 | " |

Density of saturated solution at $18^\circ = 1.776$.

CADMIUM OXALATE $\text{CdC}_2\text{O}_4 \cdot 3\text{H}_2\text{O}$.

1 liter of sat. aqueous solution contains 0.033 gm. CdC_2O_4 at 18° .

(Kohlrausch — Z. physik. Chem. 44, 197, '03.)

CADMIUM SULPHATE CdSO_4 .

SOLUBILITY IN WATER.

(Mylius and Funk — W. Abb. p. t. Reichenstalt 3, 444, '00; see also Kohnstamm and Cohn — Wied Ann. 65, 344, '98; Steinwehr — Ann. der Phys. (Drude) [4] 9, 1050, '02; Etard — Ann. chim. phys [7] 2 536, '94.)

| t °. | Gms. CdSO_4 per 100 Gms. | | Solid Phase. | t °. | Gms. CdSO_4 per 100 Gms. | | Solid Phase. |
|------|--------------------------------------|--------|---|------|--------------------------------------|--------|---|
| | Solution. | Water. | | | Solution. | Water. | |
| -17 | 44.5 | 80.2 | $\text{CdSO}_4 \cdot 7\text{H}_2\text{O}$ | 40 | 43.99 | 78.54 | $\text{CdSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$. |
| -10 | 46.1 | 85.5 | " | 60 | 44.99 | 83.68 | " |
| -5 | 48.5 | 94.2 | " | 73.5 | 46.6 | 87.28 | " |
| -18 | 43.35 | 76.52 | $\text{CdSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$ | 74.5 | 46.7 | 87.62 | $\text{CdSO}_4 \cdot \text{H}_2\text{O}$ |
| -10 | 43.27 | 76.28 | " | 77 | 42.2 | 73.02 | " |
| 0 | 43.01 | 76.48 | " | 85 | 39.6 | 65.57 | " |
| +10 | 43.18 | 76.00 | " | 90 | 38.7 | 63.13 | " |
| 20 | 43.37 | 76.60 | " | 100 | 37.8 | 60.77 | " |

SOLUBILITY OF CADMIUM SULPHATE IN AQUEOUS SOLUTIONS OF SULPHURIC ACID AT 0°.

(Engel—Compt. rend. 104, 507, '87.)

| Equivalents per 10 Gms. H ₂ O. | | Density of Solutions. | Grams per 100 Grams H ₂ O. | |
|---|---------------------|--------------------------|---------------------------------------|---------------------|
| H ₂ SO ₄ . | CdSO ₄ . | | H ₂ SO ₄ . | CdSO ₄ . |
| 0. | 71.6 | 1.609 | 0.00 | 74.61 |
| 3.87 | 70.9 | 1.591 | 1.90 | 73.87 |
| 12.6 | 62.4 | 1.545 | 6.18 | 65.03 |
| 28.1 | 50.6 | 1.476 | 13.78 | 52.73 |
| 43.3 | 40.8 | 1.435 | 21.23 | 42.52 |
| 47.6 | 37.0 | 1.421 | 23.34 | 38.56 |
| 53.8 | 32.7 | 1.407 | 26.38 | 34.07 |
| 71.5 | 23.0 | 1.379 | 35.06 | 23.96 |

SOLUBILITY OF MIXED CRYSTALS OF CADMIUM SULPHATE AND FERROUS SULPHATE IN WATER AT 25°.

(Stortenbecker—Z. physik. Chem. 34, 109, '00.)

| Composition of Solution. | | | | | Mol. per cent Cd in Crystals of Solid Phase. |
|--|---------------------|---------------------------------------|-------|-----------------------|--|
| Gms. per 100 Gms. H ₂ O. | | Mols. per 100 Mols. H ₂ O. | | Mol. % Cd. in Sol. | |
| CdSO ₄ . | FeSO ₄ . | Cd. | Fe. | | |
| Crystals with 2½ Mols. H ₂ O. | | | | | |
| 76.02 | 0.0 | 6.57 | 0.0 | 100 | 100 |
| 57.61 | 10.63 | 4.98 | 1.26 | 79.8 | 99.0 |
| Crystals with 7 Mols. H ₂ O. | | | | | |
| 57.61 | 10.63 | 4.98 | 1.26 | 79.8 | 36.6 |
| ... | ... | ... | ... | 78.5 | 34.6 |
| ... | ... | ... | ... | 44.6 | 11.1 |
| ... | ... | ... | ... | 24.4 | 4.8 |
| 0.0 | 26.69 | 0.0 | 3.165 | 0.0 | 0.0 |

CADMIUM POTASSIUM SULPHATE CdK₂(SO₄)₂.

SOLUBILITY IN WATER.

(Wyruboff—Bull. soc. chim. [3] 25, 121, '01.)

| t°. | G. CdK ₂ (SO ₄) ₂ per 100 Gms. H ₂ O. | Solid Phase. | t°. | G. CdK ₂ (SO ₄) ₂ per 100 Gms. H ₂ O. | Solid Phase. |
|-----|---|---|-----|---|--|
| 16 | 42.89 | CdK ₂ (SO ₄) ₂ ·2H ₂ O | 26 | 42.50 | CdK ₂ (SO ₄) ₂ ·1½H ₂ O |
| 31 | 46.82 | " | 31 | 42.80 | " |
| 40 | 47.40 | " | 40 | 43.45 | " |
| | | | 64 | 44.90 | " |

CADMIUM SODIUM SULPHATE

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CADMIUM SODIUM SULPHATE $\text{CdNa}_2(\text{SO}_4)_2 \cdot 2\text{H}_2\text{O}$.

SOLUBILITY IN WATER, ALSO WITH THE ADDITION OF CADMIUM SULPHATE AND OF SODIUM SULPHATE.

(Koppel, Gumpert — Z. physik. Chem. 52, 413, '05.)

| t°. | Gms. per 100 Gms. Solution. | | Gms. per 100 Gms. H_2O . | | Mols. per 100 Mols. H_2O . | | Solid Phase. |
|-------|-----------------------------|----------------------------|--|----------------------------|--|----------------------------|---|
| | CdSO_4 . | Na_2SO_4 . | CdSO_4 . | Na_2SO_4 . | CdSO_4 . | Na_2SO_4 . | |
| 24 | 22.25 | 15.07 | 35.49 | 24.04 | 3.07 | 3.05 | $\text{CdNa}_2(\text{SO}_4)_2 \cdot 2\text{H}_2\text{O}$ |
| 30 | 22.55 | 15.29 | 36.28 | 24.60 | 3.14 | 3.12 | |
| 40 | 22.89 | 15.65 | 37.24 | 25.45 | 3.22 | 3.28 | |
| 0 | 40.32 | 4.85 | 73.54 | 8.85 | 6.36 | 1.12 | |
| 10 | 39.91 | 5.24 | 72.77 | 9.55 | 6.30 | 1.21 | $\text{CdNa}_2(\text{SO}_4)_2 \cdot 2\text{H}_2\text{O}$ + $\text{CdSO}_4 \cdot \frac{3}{2}\text{H}_2\text{O}$ |
| 20 | 40.26 | 5.16 | 73.81 | 9.45 | 6.39 | 1.20 | |
| 40 | 39.89 | 7.18 | 75.38 | 13.56 | 6.52 | 1.72 | |
| -14.8 | 40.18 | 4.60 | 72.68 | 8.32 | 6.29 | 1.05 | |
| 0 | 37.30 | 6.53 | 66.32 | 11.62 | 5.74 | 1.47 | $\text{CdNa}_2(\text{SO}_4)_2 \cdot 2\text{H}_2\text{O}$ + $\text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O}$ |
| 10 | 32.53 | 8.69 | 55.34 | 14.78 | 4.79 | 1.84 | |
| 20 | 22.69 | 14.71 | 36.25 | 23.52 | 3.14 | 2.98 | |
| 25 | 16.33 | 19.82 | 25.60 | 31.06 | 2.21 | 3.94 | |
| 30 | 9.21 | 27.80 | 14.62 | 44.14 | 1.26 | 4.59 | $\text{CdNa}_2(\text{SO}_4)_2 \cdot 2\text{H}_2\text{O}$ + Na_2SO_4 |
| 35 | 8.26 | 29.35 | 13.26 | 47.06 | 1.15 | 5.96 | |
| 40 | 9.98 | 28.27 | 16.24 | 46.27 | 1.41 | 5.86 | |

CAESIUM ALUMS

SOLUBILITY OF CAESIUM CHROMIUM ALUM, CAESIUM IRON ALUM, CAESIUM INDIUM ALUM, AND OF CAESIUM VANADIUM ALUM IN WATER.

(Locke — Am. Ch. J. 27, 174, '01.)

| Formula of Alum. | t°. | Gms. per 100 cc. H_2O . | | Gram Mols. Salt per 100 cc. H_2O . |
|--|-----|---|----------------|--|
| | | Anhydrous Salt. | Hydrated Salt. | |
| $\text{Cs}_2\text{Cr}_2(\text{SO}_4)_4 \cdot 24\text{H}_2\text{O}$ | 25 | 0.57 | 0.94 | 0.00151 |
| " | 30 | 0.96 | 1.52 | 0.0025 |
| " | 35 | 1.206 | 1.91 | 0.0032 |
| " | 40 | 1.53 | 2.43 | 0.00405 |
| $\text{Cs}_2\text{Fe}_2(\text{SO}_4)_4 \cdot 24\text{H}_2\text{O}$ | 25 | 1.71 | 2.72 | 0.0045 |
| " | 30 | 2.52 | 4.01 | 0.0066 |
| " | 35 | 3.75 | 6.01 | 0.0099 |
| " | 40 | 6.04 | 9.80 | 0.0156 |
| $\text{Cs}_2\text{In}_2(\text{SO}_4)_4 \cdot 24\text{H}_2\text{O}$ | 25 | 7.57 | 11.73 | 0.0172 |
| $\text{Cs}_2\text{V}_2(\text{SO}_4)_4 \cdot 24\text{H}_2\text{O}$ | 25 | 0.771 | 1.31 | 0.00204 |

CAESIUM CHLORAUATE CsAuCl_4 .

SOLUBILITY IN WATER.

(Rosenblatt — Ber. 19, 2537, '86.)

| t°. | Gms. CsAuCl_4 per 100 Gms. Solution. | t°. | Gms. CsAuCl_4 per 100 Gms. Solution. | t°. | Gms. CsAuCl_4 per 100 Gms. Solution. |
|-----|---|-----|---|-----|---|
| 10 | 0.5 | 40 | 3.2 | 80 | 16.3 |
| 20 | 0.8 | 50 | 5.4 | 90 | 21.7 |
| 30 | 1.7 | 60 | 8.2 | 100 | 27.5 |
| | | 70 | 12.0 | | |

CAESIUM FLUOBORIDE CsBF_4 .

100 grams water dissolve 0.92 gram CsBF_4 at 20°, and 0.04 gram at 100°.

(Godeffroy — Ber. 9, 1367, '76.)

CAESIUM MERCURIO BROMIDE $\text{CsBr}_2\text{HgBr}_2$.

100 grams saturated aqueous solution contain 0.807 gram $\text{CsBr}_2\text{HgBr}_2$ at 16°.

(Wells — Am. J. Sci. [3] 44, 221, '92.)

CAESIUM CARBONATE Cs_2CO_3 .

100 grams absolute alcohol dissolve 11.1 grams Cs_2CO_3 at 19°, and 20.1 grams at b. pt.

(Bunsen.)

CAESIUM CHLORIDE CsCl .

SOLUBILITY IN WATER.

(Berkeley — Trans. Roy. Soc. (Lond.) 203 A, 208, '04; see also Hinrichsen and Sachsel — Z. physik. Chem. 50, 99, '04-'05; at 25°, Foote.)

| t°. | G. CsCl per 100 Gms. | | G. Mol. CsCl per Liter. | t°. | G. CsCl per 100 Gms. | | G. Mol. CsCl per Liter. |
|-----|----------------------|--------|----------------------------|-------|----------------------|--------|----------------------------|
| | Solution. | Water. | | | Solution. | Water. | |
| 0 | 61.7 | 161.4 | 6.74 | 60 | 69.7 | 229.7 | 8.28 |
| 10 | 63.6 | 174.7 | 7.11 | 70 | 70.6 | 239.5 | 8.46 |
| 20 | 65.1 | 186.5 | 7.38 | 80 | 71.4 | 250.0 | 8.64 |
| 30 | 66.4 | 197.3 | 7.63 | 90 | 72.2 | 260.1 | 8.80 |
| 40 | 67.5 | 208.0 | 7.86 | 100 | 73.0 | 270.5 | 8.96 |
| 50 | 68.6 | 218.5 | 8.07 | 119.4 | 74.4 | 290.0 | 9.22 |

SOLUBILITY OF MIXTURES OF CAESIUM CHLORIDE AND MERCURIC CHLORIDE IN WATER AT 25°.

(Foote — Am. Ch. J. 30, 340, '03.)

| Gms. per 100 Gms. Solution. | | Solid Phase. | Gms. per 100 Gms. Solution. | | Solid Phase. |
|--------------------------------|-------------------|---|--------------------------------|-------------------|--|
| CsCl_2 . | HgCl_2 . | | CsCl_2 . | HgCl_2 . | |
| 65.61 | 0.0 | CsCl | 38.63 | 1.32 | Double Salt $\text{CsHgCl}_3 = 38.3\% \text{ CsCl}$ |
| 65.78 | 0.215 | $\text{CsCl} + \text{Cs}_2\text{HgCl}_6$ | 17.03 | 0.51 | |
| 62.36 | 0.32 | Double Salt | 1.53 | 0.42 | |
| 57.01 | 0.64 | Cs_2HgCl_6 | 0.61 | 2.64 | $\text{CsHg} + \text{CsHg}_2\text{Cl}_5$ |
| 52.35 | 1.23 | $= 65.1\% \text{ CsCl}$ | 0.49 | 2.91 | Double Salt $\text{CsHg}_2\text{Cl}_5 = 23.7\% \text{ CsCl}$ |
| 51.08 | 1.44 | $\text{Cs}_2\text{HgCl}_6 + \text{Cs}_2\text{HgCl}_4$ | 0.40 | 3.78 | |
| 49.30 | 1.49 | Double Salt | 0.44 | 4.63 | |
| 45.95 | 1.69 | $\text{Cs}_2\text{HgCl}_4 = 55.4\% \text{ CsCl}$ | 0.41 | 4.68 | Double Salt $\text{CsHg}_3\text{Cl}_{11} = 11.1\% \text{ CsCl}$ |
| 45.23 | 1.73 | $\text{Cs}_2\text{HgCl}_4 + \text{CsHgCl}_3$ | 0.25 | 5.65 | |
| | | | 0.18 | 7.09 | |
| | | | 0.0 | 6.90 | $\text{CsHg}_4\text{Cl}_{11} + \text{HgCl}_2$ |

CAESIUM OHLOTELLURATE 82

CAESIUM OHLOTELLURATE CsTeCl_6 .

SOLUBILITY IN AQUEOUS HYDROCHLORIC ACID.

(Wheeler — Am. J. Sci. [3] 45, 267, '93.)

100 parts HCl (Sp. Gr. 1.2) dissolve 0.05 part CsTeCl_6 at 22°.

100 parts HCl (Sp. Gr. 1.05) dissolve 0.78 part CsTeCl_6 at 22°.

CAESIUM THALLIC OHLOTRIDE $3\text{CsCl} \cdot \text{TlCl}_3 \cdot 2\text{H}_2\text{O}$.

100 parts H_2O dissolve 2.76 parts $3\text{CsCl} \cdot \text{TlCl}_3 \cdot 2\text{H}_2\text{O}$ at 17°, and 33.3 parts at 100°.

(Godeffroy — Z. Österr. Apoth. Ver. No. 9, 1886.)

CAESIUM IODATE CsIO_3 .

100 parts H_2O dissolve 2.6 parts CsIO_3 at 24°, and 2.5 parts $2\text{CsIO}_3 \cdot \text{I}_2\text{O}_5$ at 21°.

(Wheeler — Am. J. Sci. [3] 44, 123, '92.)

CAESIUM IODIDE CsI .

SOLUBILITY OF MIXTURES OF CAESIUM IODIDE AND IODINE IN WATER.

(Foote — Am. Ch. J. 29, 210, '03.)

| t°. | Gms. per 100 Gms. Solution. | | t°. | Gms. per 100 Gms. Solution. | | Solid Phase at both Temps. |
|------|-----------------------------|------|------|-----------------------------|------|-----------------------------------|
| | CsI. | I. | | CsI. | I. | |
| -4 | 27.68 | 0.0 | 35.6 | 51.48 | 0.0 | CsI |
| -4 | 27.52 | 0.09 | 35.6 | 51.66 | 0.71 | CsI and CsI_3 |
| -4 | 3.18 | 0.31 | 35.6 | 10.72 | 1.78 | CsI_3 and CsI_5 |
| -0.2 | 0.85 | 0.34 | 35.6 | 3.74 | 1.60 | CsI_5 and I |

| t°. | Gms. per 100 Gms. Solution. | | In Separated Heavy Solution Gms. per 100 Gms. Solution. | | Solid Phase. |
|------|-----------------------------|-------|---|-------|-----------------------------------|
| | CsI. | I. | CsI. | I. | |
| 52.2 | 16.75 | 4.52 | ... | ... | CsI_3 and CsI_5 |
| 52.2 | 6.69 | 3.36 | ... | ... | CsI_5 and I |
| 52.2 | 6.72 | 3.32 | 22.94 | 73.72 | CsI_5 |
| 52.2 | 6.65 | 3.45 | 22.80 | 74.63 | I |
| 73 | 26.98 | 15.07 | ... | ... | CsI_3 and CsI_5 |
| 73 | 16.66 | 10.50 | 27.56 | 68.40 | CsI_5 |
| 73 | 6.27 | 4.08 | 17.68 | 80.02 | I |

CAESIUM (Tri) IODIDE CsI_3 .

100 cc. saturated aqueous caesium iodide (about 17 per cent CsI) solution contain 0.97 gram CsI_3 at 20°, density of solution = 1.154.

(Wells — Am. J. Sci. [3] 44, 221, '92.)

CAESIUM NITRATE CsNO_3 .

SOLUBILITY IN WATER.

(Berkeley — Trans. Roy. Soc. (Lond) 203 A, 213, '04.)

| t°. | Gms. CsNO_3 per 100 Gms. Solution. | | G. Mols. CsNO_3 per Liter. | t°. | Gms. CsNO_3 per 100 Gms. Solution. | | G. Mols CsNO_3 per Liter. |
|-----|---|--------|-------------------------------------|-------|---|--------|------------------------------------|
| | Solution. | Water. | | | Solution. | Water. | |
| 0 | 8.54 | 9.33 | 0.476 | 60 | 45.6 | 83.8 | 3.41 |
| 10 | 12.97 | 14.9 | 0.725 | 70 | 51.7 | 107.0 | 4.10 |
| 20 | 18.7 | 23.0 | 1.11 | 80 | 57.3 | 134.0 | 4.81 |
| 30 | 25.3 | 33.9 | 1.58 | 90 | 62.0 | 163.0 | 5.50 |
| 40 | 32.1 | 47.2 | 2.12 | 100 | 66.3 | 197.0 | 6.19 |
| 50 | 39.2 | 64.4 | 2.73 | 106.2 | 68.8 | 220.3 | 6.58 |

CAESIUM OXALATE $\text{Cs}_2\text{C}_2\text{O}_4 \cdot \text{H}_2\text{O}$.**SOLUBILITY OF MIXTURES OF CAESIUM OXALATE AND OXALIC ACID IN WATER AT 25°.**(Foote and Andrew — *Am. Ch. J.* 34 156, '05.)

Varying amounts of the two substances were dissolved in hot water and the solutions allowed to cool in a thermostat held at 25°.

| Gms. per 100 Gms. Solution. | | G. Mols. per 100 G. Mols. H_2O . | | Solid Phase. |
|------------------------------------|-------------------------------------|---|-------------------------------------|--|
| $\text{H}_2\text{C}_2\text{O}_4$. | $\text{Cs}_2\text{C}_2\text{O}_4$. | $\text{H}_2\text{C}_2\text{O}_4$. | $\text{Cs}_2\text{C}_2\text{O}_4$. | |
| 10.20 | ... | 2.274 | ... | $\text{H}_2\text{C}_2\text{O}_4 \cdot 2\text{H}_2\text{O}$ |
| 10.29 | 0.61 | 2.314 | 0.035 | $\text{H}_2\text{C}_2\text{O}_4 \cdot 2\text{H}_2\text{O} + \text{H}_5\text{Cs}(\text{C}_2\text{O}_4)_2 \cdot 2\text{H}_2\text{O}$ |
| 7.90 | 9.92 | 1.924 | 0.614 | Double Salt. |
| 4.11 | 25.12 | 1.162 | 1.81 | $\text{H}_5\text{Cs}(\text{C}_2\text{O}_4)_2 \cdot 2\text{H}_2\text{O}$ |
| 4.32 | 27.55 | 1.279 | 2.06 | |
| 4.27 | 28.30 | 1.267 | 2.14 | Double Salt. |
| 4.40 | 35.90 | 1.476 | 3.07 | $\text{H}_4\text{Cs}_2(\text{C}_2\text{O}_4)_3$ |
| 4.82 | 40.10 | 1.752 | 3.71 | |
| 4.45 | 42.32 | 1.672 | 4.05 | Double Salt. |
| 3.05 | 48.80 | 1.268 | 5.16 | |
| 1.04 | 68.69 | 0.688 | 11.56 | HCsC_2O_4 |
| 0.91 | 71.24 | 0.648 | 13.06 | $\text{HCsC}_2\text{O}_4 + \text{H}_6\text{Cs}_8(\text{C}_2\text{O}_4)_7$ |
| 0.77 | 73.45 | 0.598 | 14.51 | Double Salt. |
| 0.75 | 74.04 | 0.596 | 14.96 | $\text{H}_6\text{Cs}_8(\text{C}_2\text{O}_4)_7$ |
| 0.74 | 75.20 | 0.625 | 15.93 | |
| 0.0 | 75.82 | 0.0 | 15.97 | $\text{H}_6\text{Cs}_8(\text{C}_2\text{O}_4)_7 + \text{Cs}_2\text{C}_2\text{O}_4 \cdot \text{H}_2\text{O}$ $\text{Cs}_2\text{C}_2\text{O}_4 \cdot \text{H}_2\text{O}$ |

CAESIUM PERMANGANATE CsMnO_4 .

100 cc. sat. aqueous solution contain 0.097 gm. CsMnO_4 at 1°, 0.23 gm. at 19°, and 1.25 gms. at 59°. (Patterson — *J. Am. Chem. Soc.* 28, 1735, '06.)

CAESIUM SELENATE Cs_2SeO_4 .

100 grams H_2O dissolve 245 grams Cs_2SeO_4 at 12°.

(Tutton — *J. Chem. Soc.* 71, 850, '97.)**CAESIUM SULPHATE** Cs_2SO_4 .**SOLUBILITY IN WATER.**(Berkeley — *Trans. Roy. Soc. (Lond.)* 203 A, 210, '04.)

| t°. | Gms. Cs_2SO_4 per 100 Gms. | | G. Mols. Cs_2SO_4 per Liter. | t°. | Gms. Cs_2SO_4 per 100 Gms. | | G. Mols. Cs_2SO_4 per Liter. |
|-----|---|--------|--|-------|---|--------|--|
| | Solution. | Water. | | | Solution. | Water. | |
| 0 | 62.6 | 167.1 | 3.42 | 60 | 66.7 | 199.9 | 3.78 |
| 10 | 63.4 | 173.1 | 3.49 | 70 | 67.2 | 205.0 | 3.83 |
| 20 | 64.1 | 178.7 | 3.56 | 80 | 67.8 | 210.3 | 3.88 |
| 30 | 64.8 | 184.1 | 3.62 | 90 | 68.3 | 214.9 | 3.92 |
| 40 | 65.5 | 189.9 | 3.68 | 100 | 68.8 | 220.3 | 3.97 |
| 50 | 66.1 | 194.9 | 3.73 | 108.6 | 69.2 | 224.5 | 4.00 |

CAESIUM DOUBLE SULPHATES

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SOLUBILITY OF CAESIUM DOUBLE SULPHATES IN WATER AT 25°.

(Locke — Am. Ch. J. 27, 459, '01.)

| Name. | Formula. | Gms. Anhydrous Salt per 100 Gms. | | Gm. Mols. Salt per 100 Gms. H ₂ O. |
|----------------------------|--|-------------------------------------|--------|---|
| | | Solution. | Water. | |
| Caesium Cadmium Sulphate | C ₈ H ₂ (SO ₄) ₂ .6H ₂ O | 58.16 | 139.9 | 0.2455 |
| Caesium Cobalt Sulphate | C ₈ H ₂ Co(SO ₄) ₂ .6H ₂ O | 29.52 | 41.9 | 0.081 |
| Caesium Copper Sulphate | C ₈ H ₂ Cu(SO ₄) ₂ .6H ₂ O | 31.49 | 46.0 | 0.0882 |
| Caesium Iron Sulphate | C ₈ H ₂ Fe(SO ₄) ₂ .6H ₂ O | 50.29 | 101.1 | 0.1967 |
| Caesium Magnesium Sulphate | C ₈ H ₂ Mg(SO ₄) ₂ .6H ₂ O | 34.77 | 53.3 | 0.1106 |
| Caesium Manganese Sulphate | C ₈ H ₂ Mn(SO ₄) ₂ .6H ₂ O | 44.58 | 80.4 | 0.157 |
| Caesium Nickel Sulphate | C ₈ H ₂ Ni(SO ₄) ₂ .6H ₂ O | 20.37 | 25.6 | 0.0495 |
| Caesium Zinc Sulphate | C ₈ H ₂ Zn(SO ₄) ₂ .6H ₂ O | 27.87 | 38.6 | 0.0738 |

CAFFEINE C₈H(CH₃)₂N₄O₂.H₂O.

SOLUBILITY IN SEVERAL SOLVENTS.

(U. S. P.; Göckel — J. Chem. Soc. 74, 327, '98; Commaile — Compt. rend. 81, 819, '75.)

| Solvent. | Grams Caffeine per 100 Grams Solvent at: | | | | | |
|--------------------------|--|-------|----------------|--------|---------------------|--------|
| | 25° U. S. P. | 80° | 18° Göckel. | b. pt. | 15.17° Commaile. | b. pt. |
| Water | 2.19 | 19.23 | ... | ... | 1.31 | 45.51† |
| Alcohol | 1.88 | 5.85* | ... | ... | 0.61 | 3.12 |
| Ether | 0.267 | ... | 0.119 | 0.295 | 0.044 | 0.36 |
| Chloroform | 12.5 | ... | 11.77 | 15.63 | 12.97 | 19.02 |
| Benzene | ... | ... | 0.911 | 5.29 | ... | ... |
| Carbon Tetra Chloride | ... | ... | 0.089 | 0.702 | ... | ... |
| Carbon Bisulphide | ... | ... | ... | ... | 0.0585 | 0.454 |

* 60°.

† 65°.

CALCIUM ACETATE Ca(CH₃COO)₂.2H₂O.

SOLUBILITY IN WATER.

(Lumsden — J. Chem. Soc. 81, 355, '02; Krasnicki — Monatsh. Chem. 8, 597, '87.)

| t°. | Gms. Ca(CH ₃ COO) ₂ per 100 Gms. | | Solid Phase. | t°. | Gms. Ca(CH ₃ COO) ₂ per 100 Gms. | | Solid Phase. |
|-----|---|--------|---|-----|---|--------|---|
| | Solution. | Water. | | | Solution. | Water. | |
| 0 | 27.2 | 37.4 | Ca(CH ₃ COO) ₂ .2H ₂ O | 60 | 24.6 | 32.7 | Ca(CH ₃ COO) ₂ .2H ₂ O |
| 10 | 26.5 | 36.0 | Ca(CH ₃ COO) ₂ .2H ₂ O | 80 | 25.1 | 33.5 | Ca(CH ₃ COO) ₂ .2H ₂ O |
| 20 | 25.8 | 34.7 | Ca(CH ₃ COO) ₂ .2H ₂ O | 84 | 25.3 | 33.8 | Ca(CH ₃ COO) ₂ .2H ₂ O |
| 25 | 25.5 | 34.2 | Ca(CH ₃ COO) ₂ .2H ₂ O | 85 | 24.7 | 32.9 | Ca(CH ₃ COO) ₂ .H ₂ O |
| 30 | 25.3 | 33.8 | Ca(CH ₃ COO) ₂ .2H ₂ O | 90 | 23.7 | 31.1 | Ca(CH ₃ COO) ₂ .H ₂ O |
| 40 | 24.9 | 33.2 | Ca(CH ₃ COO) ₂ .2H ₂ O | 100 | 22.9 | 29.7 | Ca(CH ₃ COO) ₂ .H ₂ O |

SOLUBILITY OF CALCIUM ACETATE IN AN AQUEOUS SATURATED SOLUTION OF SUGAR AT 31.25°.

(Köhler — Z. Ver. Zuckerind. 47, 447, '97.)

100 gms. solution contain 8.29 gms. Ca(CH₃COO)₂ + 60.12 gms. sugar.
100 gms. water dissolve 26.3 gms. Ca(CH₃COO)₂ + 190.3 gms. sugar.

CALCIUM (Tri) Methyl **ACETATE** $\text{Ca}[(\text{CH}_3)_2\text{CCOO}]_2$.

CALCIUM (Di) Ethyl **ACETATE** $\text{Ca}[(\text{C}_2\text{H}_5)_2\text{CHCOO}]_2$.

CALCIUM Methyl Ethyl **ACETATE** $\text{Ca}[\text{CH}_3(\text{C}_2\text{H}_5)_2\text{CHCOO}]_2$.

SOLUBILITY OF EACH IN WATER.

(Landau — Monatsh. Chem. 14, 717, '93; Keppish — *Ibid.* 9, 600, '88; Sedlitzki — *Ibid.* 8, 573, '87.)

Ca. Tri Methyl Acetate. Ca. Di Ethyl Acetate. Ca. Methyl Ethyl Acetate.

| t °. | Gms. $\text{Ca}(\text{C}_2\text{H}_3\text{O}_2)_2$ per 100 Gms. | | Gms. $\text{Ca}(\text{C}_2\text{H}_5\text{O}_2)_2$ per 100 Gms. | | Gms. $\text{Ca}(\text{C}_2\text{H}_5\text{O}_2)_2$ per 100 Gms. | |
|------|--|-----------|--|-----------|--|-----------|
| | Water. | Solution. | Water. | Solution. | Water. | Solution. |
| 0 | 7.30 | 6.81 | 30.3 | 23.22 | 28.78 | 22.35 |
| 10 | 6.84 | 6.40 | 27.8 | 21.75 | 31.71 | 24.07 |
| 20 | 6.54 | 6.14 | 25.6 | 20.38 | 33.76 | 25.23 |
| 30 | 6.40 | 6.01 | 23.7 | 19.16 | 34.92 | 25.89 |
| 40 | 6.44 | 6.05 | 22.1 | 18.10 | 35.20 | 26.04 |
| 50 | 6.64 | 6.22 | 20.8 | 17.22 | 34.60 | 25.71 |
| 60 | 6.86 | 6.42 | 19.9 | 16.60 | 33.11 | 24.89 |
| 70 | 7.11 | 6.64 | 19.2 | 16.11 | 30.74 | 23.41 |
| 80 | 7.38 | 6.87 | ... | ... | 27.49 | 21.56 |

CALCIUM Methyl Propyl **ACETATE** $\text{Ca}[\text{CH}_3(\text{C}_3\text{H}_7)_2\text{CHCOO}]_2$.

CALCIUM (Di) Propyl **ACETATE** $\text{Ca}[(\text{C}_3\text{H}_7)_2\text{CHCOO}]_2$.

CALCIUM (Iso) Butyl **ACETATE** $\text{Ca}[(\text{CH}_3)_2\text{CH}(\text{CH}_2)_2\text{COO}]_2$.

SOLUBILITY OF EACH IN WATER.

(Stiasny — Monatsh. Chem. 12, 596, '91; Furth — *Ibid.* 9, 313, '88; König — *Ibid.* 15, 22, '94.)

Ca. Methyl Propyl Acetate. Ca. Di Propyl Acetate. Ca. Iso Butyl Acetate.

| t °. | Gms. $\text{Ca}(\text{C}_4\text{H}_9\text{O}_2)_2$ per 100 Gms. | | Gms. $\text{Ca}(\text{C}_4\text{H}_9\text{O}_2)_2$ per 100 Gms. | | Gms. $\text{Ca}(\text{C}_4\text{H}_9\text{O}_2)_2$ per 100 Gms. | |
|------|--|-----------|--|-----------|--|-----------|
| | Water. | Solution. | Water. | Solution. | Water. | Solution. |
| 0 | 16.58 | 14.22 | 9.57 | 8.73 | 7.48 | 6.96 |
| 10 | 15.80 | 13.65 | 8.35 | 7.71 | 6.38 | 5.99 |
| 20 | 15.14 | 13.15 | 7.19 | 6.71 | 5.66 | 5.36 |
| 30 | 14.61 | 12.75 | 6.11 | 5.77 | 5.31 | 5.04 |
| 40 | 14.21 | 12.45 | 5.09 | 4.84 | 5.31 | 5.04 |
| 50 | 13.94 | 12.24 | 4.14 | 3.98 | 5.68 | 5.37 |
| 60 | 13.79 | 12.13 | 3.25 | 3.15 | 6.41 | 6.02 |
| 70 | 13.78 | 12.12 | 2.44 | 2.38 | 7.51 | 6.98 |
| 80 | 13.89 | 12.20 | 1.65 | 1.62 | 8.97 | 8.23 |
| 90 | ... | ... | ... | ... | 10.79 | 9.74 |

CALCIUM BROMIDE CaBr_2 .

SOLUBILITY IN WATER.

(Kremers — Pogg. Ann. 103, 65, '58; Etard — Ann. chim. phys. [7] 2, 532, '94, gives results which yield an irregular curve and are evidently less accurate than those of Kremers.)

| t °. | Gms. CaBr_2 per 100 Gms. | | t °. | Gms. CaBr_2 per 100 Gms. | |
|------|-----------------------------------|-----------|------|-----------------------------------|-----------|
| | Water. | Solution. | | Water. | Solution. |
| -22 | 101 | 50.5 | 34.2 | 185 | 65 |
| 0 | 125 | 55.5 | 40 | 213 | 68.1 |
| 10 | 132 | 57.0 | 60 | 278 | 73.5 |
| 20 | 143 | 58.8 | 80 | 295 | 74.7 |
| 25 | 153 | 60.5 | 105 | 312 | 75.7 |

Density of saturated solution at 20° = 1.82.

CALCIUM (Normal) **BUTYRATE** $\text{Ca}[\text{CH}_3(\text{CH}_2)_2\text{COO}]_2 \cdot \text{H}_2\text{O}$.

CALCIUM (Iso) **BUTYRATE** $\text{Ca}[(\text{CH}_3)_2\text{CH.COO}]_2 \cdot 5\text{H}_2\text{O}$.

SOLUBILITY OF EACH IN WATER.

(Lumsden — J. Chem. Soc. 81, 355, '02; see also Chancel and Parmentier — Compt. rend. 104, 474, '87; Deszathy — Monatsh. Chem. 14, 251, '93, and also Hecht — Liebig's Annalen 213, 72, '82, give results for the normal salt which are somewhat below those of Lumsden for the lower temperatures. Sedlitzki — Monatsh. Chem. 8, 566, '87, gives slightly different results for the iso salt.)

| Calcium Normal Butyrate. | | | Calcium Iso Butyrate. | | | |
|--------------------------|--|-----------|-----------------------|--|-----------|---|
| t °. | Gms. $\text{Ca}(\text{C}_4\text{H}_7\text{O}_2)_2$ per 100 Gms. | | t °. | Gms. $\text{Ca}(\text{C}_4\text{H}_7\text{O}_2)_2$ per 100 Gms. | | Solid Phase. |
| | Water. | Solution. | | Water. | Solution. | |
| 0 | 20.31 | 16.89 | 0 | 20.10 | 16.78 | $\text{Ca}(\text{C}_4\text{H}_7\text{O}_2)_2 \cdot 5\text{H}_2\text{O}$ |
| 10 | 19.15 | 16.08 | 20 | 22.40 | 18.30 | " |
| 20 | 18.20 | 15.39 | 30 | 23.80 | 19.23 | " |
| 25 | 17.72 | 15.05 | 40 | 25.28 | 20.65 | " |
| 30 | 17.25 | 14.71 | 60 | 28.40 | 22.12 | " |
| 40 | 16.40 | 14.09 | 62 | 28.70 | 22.30 | " |
| 60 | 15.15 | 13.16 | 65 | 28.25 | 22.03 | $\text{Ca}(\text{C}_4\text{H}_7\text{O}_2)_2 \cdot \text{H}_2\text{O}$ |
| 80 | 14.95 | 13.01 | 80 | 27.00 | 21.26 | " |
| 100 | 15.85 | 13.69 | 100 | 26.10 | 20.69 | " |

CALCIUM CAPROATE $\text{Ca}[\text{CH}_3(\text{CH}_2)_4\text{COO}]_2 \cdot \text{H}_2\text{O}$.

CALCIUM 3 Methyl . **PENTANATE** $\text{Ca}[\text{CH}_2\text{CH}_2\text{CH}(\text{CH}_3)\text{CH}_2\text{COO}]_2 \cdot 3\text{H}_2\text{O}$.

CALCIUM CAPRYLATE $\text{Ca}[\text{CH}_3(\text{CH}_2)_6\text{COO}]_2 \cdot \text{H}_2\text{O}$.

SOLUBILITY OF EACH IN WATER.

(Lumsden; the Pentanate, Kulish — Monatsh. Chem. 14, 566, '93; see also Keppish — *Ibid.* 9, 594, '88, and Altschul — *Ibid.* 17, 571, '96, for results on the Caproate.)

| Ca. Caproate. | | | Ca. 3 Methyl Pentanate. | | | Ca. Caprylate. | | |
|---------------|---|-----------|-------------------------|---|-----------|----------------|---|-----------|
| t °. | Gms. $\text{Ca}(\text{C}_6\text{H}_{11}\text{O}_2)_2$ per 100 Gms. H_2O . | | | Gms. $\text{Ca}(\text{C}_6\text{H}_{11}\text{O}_2)_2$ per 100 Gms. | | | Gms. $\text{Ca}(\text{C}_8\text{H}_{15}\text{O}_2)_2$ per 100 Gms. H_2O . | |
| | Water. | Solution. | | Water. | Solution. | | Water. | Solution. |
| 0 | 2.23 | | 12.33 | 10.98 | | 0.33 | | |
| 20 | 2.18 | | 17.18 | 14.66 | | 0.31 | | |
| 40 | 2.15 | | 18.99 | 15.97 | | 0.28 | | |
| 50 | 2.10 | | 18.73 | 15.78 | | 0.26 | | |
| 60 | 2.15 | | 17.71 | 15.04 | | 0.24 | | |
| 80 | 2.30 | | 13.37 | 11.80 | | 0.32 | | |
| 100 | 2.57 | | 9.94 | 9.04 | | 0.50 | | |

CALCIUM CARBONATE CaCO_3 .

SOLUBILITY IN WATER, AS DETERMINED BY THE ELECTROLYTIC CONDUCTIVITY METHOD.

(Holleman, Kohlrausch, and Rose — Z. physik. Chem. 12, 129, 241, '93.)

1 liter solution contains 0.01 gram CaCO_3 at 8.7°, and 0.012 gram at 20°.

CALCIUM BICARBONATE $\text{Ca}(\text{HCO}_3)_2$.SOLUBILITY IN WATER AT 15° .

Calcium carbonate in presence of water, free from and containing carbon dioxide, dissolves as the hydrogen carbonate.

(Among the investigators who have reported results upon the solubility of calcium bicarbonate may be mentioned, Cossa — *Z. anal. Chem.* 8, 145, '69; Schloesing — *Compt. rend.* 74, 1522, '72; Caro — *Arch. Pharm.* [3] 4, 145, '74; Reid — *Proc. Roy. Soc. (Edin.)* 15, 151, '87-'88; Irving and Young — *J. Chem. Soc.* 56, 344, '88; Anderson — *Proc. Roy. Soc. (Edin.)* 16, 319, '88-'89; Engel — *Ann. chim. phys.* [6] 13, 348, '88; Lubavin — *J. russ. phys. chem. Ges.* 24, 389, '92; Pollacci — *L'Orosi* 19, 217, '96, etc. The results, however, which appear of most interest and reliability are the following by Treadwell and Reuter — *Z. anorg. Chem.* 67, 185, '96.)

| cc. CO_2 per 100 cc. Gaseous Phase (0° and 760 mm.). | Partial Pressure of CO_2 in mm. Hg. | Gms. per 100 cc. Saturated Solution. | | |
|---|---|--------------------------------------|-------------------------------|--------|
| | | Free CO_2 . | $\text{Ca}(\text{HCO}_3)_2$. | Ca. |
| 8.94 | 67.9 | 0.1574 | 0.1872 | 0.0462 |
| 6.04 | 45.9 | 0.0863 | 0.1755 | 0.0433 |
| 5.45 | 41.4 | 0.0528 | 0.1597 | 0.0394 |
| 2.18 | 16.6 | 0.0485 | 0.1540 | 0.0380 |
| 1.89 | 14.4 | 0.0347 | 0.1492 | 0.0368 |
| 1.72 | 13.1 | 0.0243 | 0.1331 | 0.0329 |
| 0.79 | 6.0 | 0.0145 | 0.1249 | 0.0308 |
| 0.41 | 3.1 | 0.0047 | 0.0821 | 0.0203 |
| 0.25 | 1.9 | 0.0029 | 0.0595 | 0.0147 |
| 0.08 | 0.6 | ... | 0.0402 | 0.0099 |
| ... | ... | ... | 0.0385 | 0.0095 |

Therefore 1 liter sat. solution at 15° and 0 partial pressure of CO_2 contains 0.385 gram $\text{Ca}(\text{HCl})_2$.

SOLUBILITY OF CALCIUM BICARBONATE IN AQUEOUS SODIUM CHLORIDE SOLUTION AT 15° .

(Treadwell and Reuter.)

The NaCl solution contained about 5 grams per liter, and was therefore approximately $\frac{1}{10}$ normal.

| cc. CO_2 per 100 cc. Gaseous Phase (0° and 760 mm.). | Partial Pressure of CO_2 in mm. Hg. | Grams per 100 cc. Saturated Solution. | | |
|---|---|---------------------------------------|-------------------------------|--------|
| | | Free CO_2 . | $\text{Ca}(\text{NCO}_3)_2$. | Ca. |
| 16.95 | 128.8 | 0.1325 | 0.2184 | 0.0539 |
| 11.47 | 87.2 | 0.1101 | 0.2143 | 0.0529 |
| 6.07 | 46.1 | 0.0235 | 0.1492 | 0.0368 |
| 3.16 | 24.0 | 0.0135 | 0.1183 | 0.0292 |
| 0.50 | 3.8 | 0.0027 | 0.0739 | 0.0182 |
| 0.41 | 3.4 | 0.0003 | 0.0490 | 0.0121 |
| ... | ... | ... | 0.0349 | 0.0086 |
| ... | ... | ... | 0.0332 | 0.0082 |

SOLUBILITY OF CALCIUM BICARBONATE IN AQUEOUS SOLUTIONS OF AMMONIUM NITRATE, SODIUM CHLORIDE AND OF SODIUM SULPHATE.

(Cameron and Seidel — J. Physic. Chem. 6, 50, '02; Berju and Kosminiko — Landw. Vers. Stat. 60, 422, '04.)

| In NH_4NO_3 Solutions at 18°. | | In NaCl Solutions at 25°. | | In Na_2SO_4 Solutions at 24°. | | |
|---|-------------------------------|------------------------------------|-------------------------------|---|------------------------------------|-------------------------------|
| Grams per Liter Solution. | | Grams per Liter Solution. | | Grams per Liter Solution. | | |
| NH_4NO_3 . | $\text{Ca}(\text{HCO}_3)_2$. | NaCl . | $\text{Ca}(\text{HCO}_3)_2$. | Na_2SO_4 . | $\text{Ca}(\text{HCO}_3)_2$ total. | $\text{Ca}(\text{HCO}_3)_2$. |
| 0 | 0.210 | 0 | 0.1046 | 0 | 0.092 | 0.092 |
| 5 | 0.340 | 5 | 0.150 | 5 | 0.175 | 0.175 |
| 10 | 0.415 | 10 | 0.180 | 10 | 0.232 | 0.220 |
| 20 | 0.547 | 20 | 0.210 | 20 | 0.277 | 0.262 |
| 40 | 0.744 | 40 | 0.225 | 40 | 0.332 | 0.307 |
| 80 | 0.940 | 80 | 0.220 | 80 | 0.400 | 0.347 |
| | | 100 | 0.215 | 100 | 0.432 | 0.355 |
| | | 150 | 0.192 | 150 | 0.510 | 0.382 |
| | | 200 | 0.170 | 200 | 0.600 | 0.400 |
| | | 250 | 0.137 | 250 | 0.725 | 0.435 |

 CALCIUM CHLORATE $\text{Ca}(\text{ClO}_3)_2 \cdot 2\text{H}_2\text{O}$.

 100 grams saturated aqueous solution contain 64.0 grams $\text{Ca}(\text{ClO}_3)_2$ at 18°. Density of solution is 1.729.

(Mylius and Funk — Ber. 30, 1718, '97.)

 CALCIUM CHLORIDE CaCl_2 .

SOLUBILITY IN WATER.

 (Roozeboom — Z. physik. Chem. 4, 42, '89; see also Mulder; Ditte — Compt. rend. 92, 242, '81; Engel — Ann. chim. phys. [6] 13, 381, '88; Etard — *Ibid.* [7] 2, 532, '94.)

| t°. | Gms. CaCl_2 per 100 Gms. | | Solid Phase. | t°. | Gms. CaCl_2 per 100 Gms. | | Solid Phase. |
|------|-----------------------------------|-----------|--|-------|-----------------------------------|-----------|--|
| | Water. | Solution. | | | Water. | Solution. | |
| —55 | 42.5 | 29.8 | $\text{Ice} + \text{CaCl}_2 \cdot 6\text{H}_2\text{O}$ | 60 | 136.8 | 57.8 | $\text{CaCl}_2 \cdot 2\text{H}_2\text{O}$ |
| —25 | 50.0 | 33.3 | $\text{CaCl}_2 \cdot 6\text{H}_2\text{O}$ | 70 | 141.7 | 58.6 | $\text{CaCl}_2 \cdot 2\text{H}_2\text{O}$ |
| 0 | 59.5 | 37.3 | $\text{CaCl}_2 \cdot 6\text{H}_2\text{O}$ | 80 | 147.0 | 59.5 | $\text{CaCl}_2 \cdot 2\text{H}_2\text{O}$ |
| 10 | 65.0 | 39.4 | $\text{CaCl}_2 \cdot 6\text{H}_2\text{O}$ | 90 | 152.7 | 60.6 | $\text{CaCl}_2 \cdot 2\text{H}_2\text{O}$ |
| 20 | 74.5 | 42.7 | $\text{CaCl}_2 \cdot 6\text{H}_2\text{O}$ | 100 | 159.0 | 61.4 | $\text{CaCl}_2 \cdot 2\text{H}_2\text{O}$ |
| 30.2 | 102.7 | 50.7 | $\text{CaCl}_2 \cdot 6\text{H}_2\text{O}$ | 120 | 173.0 | 63.4 | $\text{CaCl}_2 \cdot 2\text{H}_2\text{O}$ |
| 20 | 91.0 | 47.6 | $\text{CaCl}_2 \cdot 4\text{H}_2\text{O} \alpha$ | 140 | 191.0 | 65.6 | $\text{CaCl}_2 \cdot 2\text{H}_2\text{O}$ |
| 29.8 | 100.6 | 50.1 | $4\text{H}_2\text{O} \alpha + 6\text{H}_2\text{O}$ | 160 | 222.5 | 69.0 | $\text{CaCl}_2 \cdot 2\text{H}_2\text{O}$ |
| 40 | 115.3 | 53.4 | $4\text{H}_2\text{O} \alpha$ | 170 | 255.0 | 71.8 | $\text{CaCl}_2 \cdot 2\text{H}_2\text{O}$ |
| 20 | 104.5 | 51.1 | $\text{CaCl}_2 \cdot 4\text{H}_2\text{O} \beta$ | 175.5 | 297.0 | 74.8 | $\text{CaCl}_2 \cdot 2\text{H}_2\text{O} + \text{CaCl}_2 \cdot \text{H}_2\text{O}$ |
| 29.2 | 112.8 | 53.0 | $4\text{H}_2\text{O} \beta + 6\text{H}_2\text{O}$ | 180 | 300.0 | 75.0 | $\text{CaCl}_2 \cdot \text{H}_2\text{O}$ |
| 35 | 122.5 | 55.0 | $4\text{H}_2\text{O} \beta$ | 200 | 311.0 | 75.7 | $\text{CaCl}_2 \cdot \text{H}_2\text{O}$ |
| 38.4 | 127.5 | 56.0 | $4\text{H}_2\text{O} \beta + \text{CaCl}_2 \cdot 2\text{H}_2\text{O}$ | 235 | 332.0 | 76.8 | $\text{CaCl}_2 \cdot \text{H}_2\text{O}$ |
| 45.3 | 130.2 | 56.6 | $4\text{H}_2\text{O} \alpha + \text{CaCl}_2 \cdot 2\text{H}_2\text{O}$ | 260 | 347.0 | 77.6 | $\text{CaCl}_2 \cdot \text{H}_2\text{O}$ |

Density of saturated solution at 0° = 1.367, at 15° = 1.399, at 18° = 1.417.

SOLUBILITY OF CALCIUM CHLORIDE IN AQUEOUS SOLUTIONS OF HYDROCHLORIC ACID AT 0°.

(Engel — Compt. rend. 104, 434, '87.)

| G. Mols. in Mgs. per 10 cc. Solution. | | Density of Solutions. | Grams per 100 cc. Solution. | |
|---|-------|--------------------------|--------------------------------|-------|
| $\frac{1}{2}$ CaCl ₂ . | HCl. | | CaCl ₂ . | HCl. |
| 92.7 | 0.0 | 1.367 | 51.45 | 0.0 |
| 83.7 | 9.1 | 1.344 | 46.45 | 3.32 |
| 77.1 | 16.0 | 1.326 | 42.80 | 5.83 |
| 66.25 | 29.25 | 1.310 | 36.77 | 10.66 |
| 53.75 | 43.45 | 1.283 | 29.84 | 15.84 |
| 36.25 | 63.5 | 1.250 | 20.12 | 23.15 |
| 20.3 | 95.0 | 1.238 | 11.29 | 34.62 |

SOLUBILITY OF MIXTURES OF CALCIUM CHLORIDE AND ALKALI CHLORIDES.

(Mulder; Rüdorff.)

100 grams H₂O dissolve 63.5 grams CaCl₂ + 4.9 grams KCl at 7° (M)
 100 grams H₂O dissolve 57.6 grams CaCl₂ + 2.4 grams NaCl at 4° (M)
 100 grams H₂O dissolve 59.5 grams CaCl₂ + 4.6 grams NaCl at 7° (M)
 100 grams H₂O dissolve 72.6 grams CaCl₂ + 16.0 grams NaCl at 15° (R)

SOLUBILITY OF CALCIUM CHLORIDE IN AQUEOUS ALCOHOL AT ROOM TEMPERATURE.

(Bödtker — Z. physik. Chem. 22, 570, '97.)

| Solution Used. | Vol. per cent Alcohol. | Gms. CaCl ₂ per 5 cc. Sol. | Solution Used. | Vol. per cent Alcohol. | Gms. CaCl ₂ per 5 cc. Sol. |
|---|---------------------------------|--|--|---------------------------------|--|
| 15 Gms. CaCl ₂ .6H ₂ O + 20 cc. alcohol | 92.3 | 1.430 | 15 Gms. CaCl ₂ .6H ₂ O + 20 cc.: alcohol + 2 Gms. CaCl ₂ | 99.3 | 1.561 |
| 15 Gms. CaCl ₂ .6H ₂ O + 20 cc. alcohol | 97.3 | 1.409 | “ + 3 “ “ | “ | 1.590 |
| 15 Gms. CaCl ₂ .6H ₂ O + 20 cc. alcohol | 99.3 | 1.429 | “ + 4 “ “ | “ | 1.641 |
| 15 Gms. CaCl ₂ .6H ₂ O + 1 Gm. CaCl ₂ | 99.3 | 1.529 | “ + 5 “ “ | “ | 1.709 |

SOLUBILITY OF CALCIUM CHLORIDE IN A SATURATED SOLUTION OF SUGAR AT 31.25°.

(Köhler — Z. Ver. Zuckerind. 47, 447, '97.)

100 grams saturated solution contain 42.84 grams sugar + 25.25 grams CaCl₂, or 100 grams water dissolve 135.1 grams sugar + 79.9 grams CaCl₂.

CALCIUM CITRATE Ca₃(C₆H₅O₇)₂.4H₂O.

SOLUBILITY IN WATER AND IN ALCOHOL AT 18° AND AT 25°.

(Partheil and Hübner — Archiv. Pharm. 241, 413, '03.)

| Solvent. | Grams Ca ₃ (C ₆ H ₅ O ₇) ₂ .4H ₂ O per 100 Gms. Solvent at: | |
|--------------------------------|---|--------|
| | 18°. | 25°. |
| Water | 0.08496 | 0.0959 |
| Alcohol (Sp. Gr. 0.8092 = 95%) | 0.0065 | 0.0089 |

CALCIUM CHROMATE

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CALCIUM CHROMATE CaCrO_4 .**SOLUBILITY OF THE SEVERAL HYDRATES IN WATER.**

(Mylus and Wrochem — Wiss. Abh. p. t. Reichenstalt 3, 462, '00.)

| t°. | Gms. CaCrO_4 per 100 Gms. | | Mols. CaCrO_4 per 100 Mols. H_2O . | t°. | Gms. CaCrO_4 per 100 Gms. | | Mols. CaCrO_4 per 100 Mols. H_2O . |
|--|------------------------------------|-----------|---|---|------------------------------------|-----------|---|
| | Water. | Solution. | | | Water. | Solution. | |
| Solid Phase, α $\text{CaCrO}_4 \cdot 2\text{H}_2\text{O}$. (Monoclinic.) | | | | Solid Phase, $\text{CaCrO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$. | | | |
| 0 | 17.3 | 14.75 | 2.0 | 0 | 7.3 | 6.8 | 0.84 |
| 18 | 16.68 | 14.3 | 1.93 | 18 | 4.8 | 4.4 | 0.51 |
| 20 | 16.6 | 14.22 | 1.93 | 31 | 3.84 | 3.7 | 0.44 |
| 30 | 16.5 | 13.89 | 1.85 | 38.5 | 2.67 | 2.6 | 0.31 |
| 45 | 14.3 | 12.53 | 1.65 | 50 | 1.63 | 1.6 | 0.19 |
| Solid Phase, β $\text{CaCrO}_4 \cdot 2\text{H}_2\text{O}$ (Rhombic.) | | | | 60 | 1.13 | 1.1 | 0.13 |
| 0 | 10.9 | 9.8 | 1.25 | 100 | 0.81 | 0.8 | 0.09 |
| 18 | 11.5 | 10.3 | 1.33 | Solid Phase, CaCrO_4 . | | | |
| 40 | 11.6 | 10.4 | 1.34 | 0 | 4.5 | 4.3 | 0.52 |
| Solid Phase, $\text{CaCrO}_4 \cdot \text{H}_2\text{O}$. | | | | 18 | 2.32 | 2.27 | 0.27 |
| 0 | 13.0 | 11.5 | 1.50 | 31 | 2.92 | 1.89 | 0.22 |
| 18 | 10.6 | 9.6 | 1.22 | 50 | 1.12 | 1.11 | 0.13 |
| 25 | 10.0 | 9.1 | 1.15 | 60 | 0.83 | 0.82 | 0.11 |
| 40 | 8.5 | 7.8 | 0.98 | 70 | 0.80 | 0.79 | 0.09 |
| 60 | 6.1 | 5.7 | 0.70 | 100 | 0.42 | 0.42 | 0.05 |
| 75 | 4.8 | 4.6 | 0.56 | | | | |
| 100 | 3.2 | 3.1 | 0.37 | | | | |

Densities of the saturated solutions of the above several hydrates at 18° are: α $\text{CaCrO}_4 \cdot 2\text{H}_2\text{O}$, 1.149; β $\text{CaCrO}_4 \cdot 2\text{H}_2\text{O}$, 1.105; $\text{CaCrO}_4 \cdot \text{H}_2\text{O}$, 1.096; $\text{CaCrO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$, 1.044; CaCrO_4 , 1.023.

100 cc. 29% alcohol dissolve 1.206 grams CaCrO_4 .

100 cc. 53% alcohol dissolve 0.88 gram CaCrO_4 .

(Fresenius — Z. anal. Chem. 30, 672, '91.)

CALCIUM POTASSIUM FERROCYANIDE $\text{CaK}_2\text{Fe}(\text{CN})_6 \cdot 3\text{H}_2\text{O}$.

100 parts H_2O dissolve 0.125 part salt at 15°, and 0.69 part at b. pt.

(Kunheim and Zimmerman — Dingt. polyt. J. 252, 478, '84.)

CALCIUM FLUORIDE CaF_2 .

1 liter of saturated aqueous solution contains 0.016 gram CaF_2 at 18°. Determined by the electrolytic method.

(Kohlrausch — Z. physik. Chem. 44, 197, '03.)

CALCIUM FORMATE $\text{Ca}(\text{HCOO})_2$.**SOLUBILITY IN WATER.**

(Lumaden — J. Chem. Soc. 81, 355, '02; see also Krasnicki — Monatsch. Chem. 8, 597, '87.)

| t°. | Gms. $\text{Ca}(\text{HCOO})_2$ per 100 Gms. | | t°. | Gms. $\text{Ca}(\text{HCOO})_2$ per 100 Gms. | |
|-----|--|-----------|-----|--|-----------|
| | Water. | Solution. | | Water. | Solution. |
| 0 | 16.15 | 13.90 | 60 | 17.50 | 14.89 |
| 20 | 16.60 | 14.22 | 80 | 17.95 | 15.22 |
| 40 | 17.05 | 14.56 | 100 | 18.40 | 15.53 |

CALCIUM HEPTOATE (Oenanthate) $\text{Ca}[\text{CH}_2(\text{CH}_2)_6\text{COO}]_2 \cdot \text{H}_2\text{O}$.

SOLUBILITY IN WATER.

(Lumsden — J. Chem. Soc. 81, 355, '02; see also Landau — Monatsch. Chem. 14, 712, '93; Altschul — *Ibid.* 17, 575, '96.)

| t°. | 0°. | 20°. | 40°. | 60°. | 80°. | 100°. |
|--|------|------|------|------|------|-------|
| G. $\text{Ca}(\text{C}_7\text{H}_{15}\text{O}_2)_2$ per 100 gms. solution | 0.94 | 0.85 | 0.81 | 0.81 | 0.97 | 1.24 |

CALCIUM HYDROXIDE $\text{Ca}(\text{OH})_2$.

SOLUBILITY IN WATER.

(Average curve from the results of Lamy — Ann. chim. phys. [5] 14, 145, '78; Mahen — Pharm. J. Trans [3] 14, 505, '83-84; Herzfeld — Z. Ver Zuckerind. 34, 820, '97, and Guthrie — J. Soc. Chem. Ind. 20, 224, '01.)

| t°. | Grams per 100 Grams H_2O . | | t°. | Grams per 100 Grams H_2O . | |
|-----|--|----------------|-----|--|----------------|
| | $\text{Ca}(\text{OH})_2$. | CaO . | | $\text{Ca}(\text{OH})_2$. | CaO . |
| 0 | 0.185 | 0.140 | 50 | 0.128 | 0.097 |
| 10 | 0.176 | 0.133 | 60 | 0.116 | 0.088 |
| 20 | 0.165 | 0.125 | 70 | 0.106 | 0.080 |
| 25 | 0.159 | 0.120 | 80 | 0.094 | 0.071 |
| 30 | 0.153 | 0.116 | 90 | 0.085 | 0.064 |
| 40 | 0.141 | 0.107 | 100 | 0.077 | 0.058 |

SOLUBILITY OF CALCIUM HYDROXIDE IN AQUEOUS SOLUTIONS OF AMMONIUM CHLORIDE AT 25°.

(Noyes and Chapin — Z. physik. Chem. 28, 520, '99.)

| Millimols per Liter. | | Grams per Liter of Saturated Solution. | | |
|--------------------------|----------------------------|--|----------------------------|----------------|
| NH_4Cl . | $\text{Ca}(\text{OH})_2$. | NH_4Cl . | $\text{Ca}(\text{OH})_2$. | CaO . |
| 0.00 | 20.22 | 0.00 | 1.50 | 1.13 |
| 21.76 | 29.08 | 1.165 | 2.16 | 1.63 |
| 43.52 | 39.23 | 2.330 | 2.91 | 2.20 |
| 83.07 | 59.68 | 4.447 | 4.42 | 3.45 |

SOLUBILITY OF CALCIUM HYDROXIDE IN AQUEOUS SOLUTIONS OF CALCIUM CHLORIDE.

(Zahorsky — Z. anorg. Chem. 3, 41, '93; Lunge — J. Soc. Chem. Ind. 11, 882, '92.)

| Concentration of CaCl_2 Solutions, Wt. %. | Grams CaO Dissolved per 100 cc. Solvent at: | | | | |
|---|--|---------|--------|--------|--------|
| | 20°. | 40°. | 60°. | 80°. | 100°. |
| 0 | 0.1374 | 0.1162 | 0.1026 | 0.0845 | 0.0664 |
| 5 | 0.1370 | 0.1160 | 0.1020 | 0.0936 | 0.0906 |
| 10 | 0.1661 | 0.1419 | 0.1313 | 0.1328 | 0.1389 |
| 15 | 0.1993 | 0.1781 | 0.1706 | 0.1736 | 0.1842 |
| 20 | 0.1857* | 0.2249 | 0.2204 | 0.2295 | 0.2325 |
| 25 | 0.1661* | 0.3020* | 0.2989 | 0.3261 | 0.3710 |
| 30 | 0.1630* | 0.3680* | 0.3664 | 0.4122 | 0.4922 |

* Indicates cases in which a precipitate of calcium oxychloride separated and thus removed some of the CaCl_2 from solution.The results in 0% CaCl_2 solutions, i.e., in pure water, are high when compared with the average results given above.

CALCIUM HYDROXIDE

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SOLUBILITY OF CALCIUM HYDROXIDE IN AQUEOUS SOLUTIONS OF POTASSIUM CHLORIDE AND OF SODIUM CHLORIDE.

(Cabot — J. Soc. Chem. Ind. 16, 417, '97.)

| Gms. of the Chloride per Liter. | In KCl Solutions. | | | In NaCl Solutions. | | |
|---------------------------------|------------------------|-------|-------|------------------------|-------|-------|
| | Gms. CaO per Liter at: | | | Gms. CaO per Liter at: | | |
| | 0°. | 15°. | 99°. | 0°. | 15°. | 99°. |
| 0 | 1.36 | 1.31 | 0.635 | 1.36 | 1.31 | 0.635 |
| 30 | 1.701 | 1.658 | 0.788 | 1.813 | 1.703 | 0.969 |
| 60 | 1.725 | 1.674 | 0.876 | ... | 1.824 | 1.004 |
| 120 | 1.718 | 1.606 | 0.894 | 1.86 | 1.722 | 1.015 |
| 240 | 1.248 | 1.199 | 0.617 | 1.37 | 1.274 | 0.771 |
| 320 | ... | ... | ... | 1.054 | 0.929 | 0.583 |

SOLUBILITY OF LIME IN AQUEOUS SOLUTIONS OF SODIUM CHLORIDE ALONE AND CONTAINING SODIUM HYDROXIDE.

(Margiet — Bull. soc. chim. [3] 33, 631, '05.)

| G. NaCl per Liter. | Gms. CaO per Liter of Solution. | | | G. NaCl per Liter. | Gms. CaO per Liter of Solution. | | |
|--------------------|---------------------------------|-----------------------|-----------------------|--------------------|---------------------------------|-----------------------|-----------------------|
| | Without NaOH. | 0.80. NaOH per Liter. | 4.00. NaOH per Liter. | | Without NaOH. | 0.80. NaOH per Liter. | 4.00. NaOH per Liter. |
| 0 | 1.3 | 0.8 | 0.22 | 150 | 1.65 | 1.25 | 0.44 |
| 5 | 1.4 | 0.9 | ... | 175 | 1.6 | 1.2 | ... |
| 10 | 1.6 | 1.0 | ... | 182 | 1.6 | 1.2 | ... |
| 25 | 1.7 | 1.1 | ... | 225 | 1.4 | 1.0 | ... |
| 50 | 1.8 | 1.25 | ... | 250 | 1.3 | 0.9 | ... |
| 75 | 1.9 | 1.4 | 0.55 | 300 | 1.1 | 0.7 | 0.22 |
| 100 | 1.85 | 1.4 | ... | ... | ... | ... | ... |

SOLUBILITY OF CALCIUM HYDROXIDE IN AQUEOUS SOLUTIONS OF SODIUM HYDROXIDE.

(d'Anselme — Bull. soc. chim. [3] 29, 938, '03.)

| Concentration of NaOH: | | Grams CaO per Liter Sat. Solution at: | | | |
|------------------------|----------------|---------------------------------------|-------|-------|-------|
| Normality. | Gms. per Liter | 20°. | 50°. | 70°. | 100°. |
| 0 | 0 | 1.170 | 0.880 | 0.75 | 0.54 |
| N/100 | 0.4 | 0.94 | 0.65 | 0.53 | 0.35 |
| N/25 | 1.6 | 0.57 | 0.35 | 0.225 | 0.14 |
| N/15 | 2.66 | 0.39 | 0.20 | 0.11 | 0.05 |
| N/8 | 5.00 | 0.18 | 0.06 | 0.04 | 0.01 |
| N/5 | 8.00 | 0.11 | 0.02 | 0.01 | trace |
| N/2 | 20.00 | 0.02 | trace | 0.00 | 0.00 |

For results upon mixtures of calcium hydroxide and alkali carbonates and hydroxides, see Bodländer — Z. angew. Chem. 18, 1138, '05.

SOLUBILITY OF CALCIUM HYDROXIDE IN AQUEOUS SOLUTIONS OF GLYCERINE AT 25°.

(Herz and Knoch — Z. anorg. Chem. 46, 193, '05; for older determinations, see Berthelot — Ann. chim. phys. [3] 46, 176; and Caries — Arch. Pharm. [3] 4, 558, '74.)

| Density of Solutions | Wt. per cent Glycerine in Solution. | Millimols $\frac{1}{2}\text{Ca(OH)}_2$ per 100 cc. Solution. | Gms. per 100 cc. Solution. | |
|----------------------|-------------------------------------|--|----------------------------|--------------|
| | | | Ca(OH)_2 | CaO |
| 1.0003 | 0.0 | 4.3 | 0.1593 | 0.1206 |
| 1.0244 | 7.15 | 8.13 | 0.3013 | 0.2281 |
| 1.0537 | 20.44 | 14.9 | 0.5522 | 0.4180 |
| 1.0842 | 31.55 | 22.5 | 0.8339 | 0.6313 |
| 1.1137 | 40.95 | 40.1 | 1.486 | 1.125 |
| 1.1356 | 48.7 | 44.0 | 1.631 | 1.234 |
| 1.2072 | 69.2 | 95.8 | 3.550 | 2.687 |

SOLUBILITY OF LIME IN AQUEOUS SOLUTIONS OF SUGAR.

(Weisberg — Bull. soc. chim. [3] 21, 775, '99.)

The original results were plotted on cross-section paper and the following table constructed from the curves.

1st series, $t^\circ = 16'-17^\circ$.

| Gms. per 100 Gms. Solution. | | G. CaO per 100 Gms. Sugar in Sol. |
|-----------------------------|------|-----------------------------------|
| Sugar. | CaO. | |
| 1 | 0.30 | 35.0 |
| 2 | 0.56 | 28.7 |
| 3 | 0.85 | 28.0 |
| 4 | 1.12 | 27.7 |
| 5 | 1.40 | 27.5 |
| 6 | 1.65 | 27.5 |
| 8 | 2.22 | 27.5 |
| 10 | 2.77 | 27.5 |
| 12 | 3.27 | 27.5 |
| 14 | 3.85 | 27.5 |

2d, series $t^\circ = 15^\circ$.

| Gms. per 100 Gms. Solution. | | G. CaO per 100 Gms. Sugar in Sol. |
|-----------------------------|------|-----------------------------------|
| Sugar. | CaO. | |
| 1 | 0.50 | 62.5 |
| 2 | 0.75 | 36.0 |
| 3 | 1.02 | 32.5 |
| 4 | 1.22 | 30.2 |
| 5 | 1.45 | 28.5 |
| 6 | 1.67 | 27.7 |
| 8 | 2.22 | 27.5 |
| 10 | 2.77 | 27.5 |
| 12 | 3.27 | 27.5 |
| 14 | 3.85 | 27.5 |

In the second series a very much larger excess of lime was used than in the first series. The author gives results in a subsequent paper, — Bull. soc. chim. [3] 23, 740, '00, — which show that the solubility is also affected by the condition of the calcium compound used, *i.e.*, whether the oxide, hydrate, or milk of lime is added to the sugar solutions.

CALCIUM IODATE $\text{Ca}(\text{IO}_3)_2 \cdot 6\text{H}_2\text{O}$.

SOLUBILITY IN WATER.

(Mylus and Funk — Ber. 30, 1724, '97; W. Abb. p. t. Reichenstalt 3, 448, '00.)

| t °. | Gms. $\text{Ca}(\text{IO}_3)_2$ per 100 Gms. Sol. | Mols. $\text{Ca}(\text{IO}_3)_2$ per 100 Mols. H_2O . | Solid Phase. | t °. | Gms. $\text{Ca}(\text{IO}_3)_2$ per 100 Gms. Sol. | Mols. $\text{Ca}(\text{IO}_3)_2$ per 100 Mols. H_2O . | Solid Phase. |
|------|--|--|--|------|--|--|---|
| 0 | 0.10 | 0.0044 | $\text{Ca}(\text{IO}_3)_2 \cdot 6\text{H}_2\text{O}$ | 21 | 0.37 | 0.016 | $\text{Ca}(\text{IO}_3)_2 \cdot \text{H}_2\text{O}$ |
| 10 | 0.17 | 0.0075 | " | 35 | 0.48 | 0.021 | " |
| 18 | 0.25 | 0.011 | " | 40 | 0.52 | 0.023 | " |
| 30 | 0.42 | 0.019 | " | 45 | 0.54 | 0.024 | " |
| 40 | 0.61 | 0.027 | " | 50 | 0.59 | 0.026 | " |
| 50 | 0.89 | 0.040 | " | 60 | 0.65 | 0.029 | " |
| 54 | 1.04 | 0.046 | " | 80 | 0.79 | 0.034 | " |
| 60 | 1.36 | 0.063 | " | 100 | 0.94 | 0.042 | " |

Density of solution saturated at 18° = 1.00.

CALCIUM IODIDE CaI_2 .

SOLUBILITY IN WATER.

(Average curve from the results of Kremers — Pogg. Ann. 103, 65, '58; Etard — Ann. chim. phys. [7] 2, 532, '94.)

| t °. | Gms. CaI_2 per 100 Gms. Solution. | t °. | Gms. CaI_2 per 100 Gms. Solution. | t °. | Gms. CaI_2 per 100 Gms. Solution. |
|------|---|------|---|------|---|
| 0 | 64.6 | 30 | 69 | 80 | 78 |
| 10 | 66.0 | 40 | 70.8 | 100 | 81 |
| 20 | 67.6 | 60 | 74 | | |

Density of solution saturated at 20° = 2.125.

CALCIUM (Neutral) **MALATE** $\text{Ca}(\text{C}_4\text{H}_4\text{O}_6)_2 \cdot 3\text{H}_2\text{O}$.**CALCIUM** (Acid) **MALATE** $\text{Ca}(\text{C}_4\text{H}_4\text{O}_6)_2 \cdot 6\text{H}_2\text{O}$.**CALCIUM MALONATE** $\text{Ca}(\text{C}_2\text{H}_2\text{O}_4)_2 \cdot 4\text{H}_2\text{O}$.

SOLUBILITY OF EACH IN WATER.

(Iwig and Hecht — Liebig's Ann. 233, 167, '86; Cantoni and Basadonna — Bull. soc. chim. [3] 35, 1731, '06; the malonate, Miczynski — Monatsb. Chem. 7, 261, '86.)

| Ca. Neutral Malate. | | | | Ca. Acid Malate. | | Ca. Malonate. | |
|---------------------|---|-----------|---------------------|---|-----------|--|--|
| t °. | Gms. $\text{Ca}(\text{C}_4\text{H}_4\text{O}_6)_2$ per 100. | | | Gms. $\text{Ca}(\text{C}_4\text{H}_4\text{O}_6)_2$ per 100 Gms. | | Gms. $\text{Ca}(\text{C}_2\text{H}_2\text{O}_4)_2$ per 100 | |
| | Gms. H_2O . | Gms. Sol. | cc. Sol. (C and B). | Water. | Solution. | Gms. H_2O . | |
| 0 | ... | ... | ... | ... | ... | 0.290 | |
| 10 | 0.85 | 0.84 | ... | 1.8 | 1.77 | 0.330 | |
| 20 | 0.82 | 0.81 | 0.907 | 1.5 | 1.48 | 0.365 | |
| 30 | 0.78 | 0.77 | 0.835 | 2.0 | 1.96 | 0.396 | |
| 40 | 0.74 | 0.73 | 0.816 | 5.2 | 4.94 | 0.422 | |
| 50 | 0.66 | 0.65 | 0.809 | 15.0 | 13.09 | 0.443 | |
| 57 | 0.57 | 0.56 | ... | 32.24 | 24.29 | ... | |
| 60 | 0.58 | 0.58 | 0.804 | 26.0 | 20.64 | 0.460 | |
| 70 | 0.63 | 0.63 | 0.795 | 11.0 | 9.91 | 0.472 | |
| 80 | 0.71 | 0.70 | 0.754 | 6.8 | 6.37 | 0.479 | |
| 90 | ... | ... | 0.740 | ... | ... | | |

SOLUBILITY OF CALCIUM MALATE IN WATER AND IN ALCOHOL.

(Partheil and Hübner — Archiv. Pharm. 241, 413, '03.)

100 grams H_2O dissolve 0.9214 gram $\text{CaC}_4\text{H}_4\text{O}_6 \cdot \text{H}_2\text{O}$ at 18°, and 0.8552 gram at 25°.100 grams 95% alcohol dissolve 0.0049 gram $\text{CaC}_4\text{H}_4\text{O}_6 \cdot \text{H}_2\text{O}$ at 18°, and 0.00586 gram at 25°.

CALCIUM NITRATE $\text{Ca}(\text{NO}_3)_2 \cdot 2\text{H}_2\text{O}$.

SOLUBILITY IN WATER AT 18°.

(Mylus and Funk — Ber. 30, 1718, '97.)

100 grams saturated solution contain 54.8 grams $\text{Ca}(\text{NO}_3)_2$. Density of solution, 1.548.

CALCIUM OXALATE $\text{Ca}(\text{COO})_2 \cdot \text{H}_2\text{O}$.

SOLUBILITY IN WATER, BY ELECTROLYTIC CONDUCTIVITY METHOD.

(Holleman, Kohlrausch, and Rose — Z. physik. Chem. 12, 129, 241, '93; Richards, McCaffrey, and Bisbee — Z. anorg. Chem. 28, 85, '01.)

| t°. | Gms. CaC_2O_4 per Liter of Solution. | t°. | Gms. CaC_2O_4 per Liter of Solution. |
|-----|---|-----|---|
| 13 | 0.0067 (H) | 25 | 0.0068 (R, McC and B) |
| 18 | 0.0056 (K and R) | 50 | 0.0095 " |
| 24 | 0.0080 (H) | 95 | 0.0140 " |

SOLUBILITY OF CALCIUM OXALATE IN AQUEOUS SOLUTIONS OF ACETIC ACID AT 26°-27°.

(Herz and Muhs — Ber. 36, 3715, '03.)

| Normality of Acetic Acid. | G. CH_3COOH per 100 cc. Sol. | Residue from 50.052 cc. Solution. |
|------------------------------|---|--------------------------------------|
| 0 | 0.00 | 0.0017 |
| 0.58 | 3.48 | 0.0048 |
| 2.89 | 17.34 | 0.0058 |
| 5.79 | 34.74 | 0.0064 |

The residues were dried at 70° C.

CALCIUM PHOSPHATE (Tribasic) $\text{Ca}_3(\text{PO}_4)_2$.

SOLUBILITY IN WATER.

The determinations of the solubility of this salt in water, as stated in the literature, are found to vary within rather wide limits, due, no doubt, to the fact that so-called tribasic calcium phosphate is apparently a solid solution of the dibasic salt and calcium oxide, and therefore analyses of individual samples may show an excess of either lime or phosphoric acid. When placed in contact with water, more PO_4 ions enter solution than Ca ions, the resulting solution being acid in reaction and the solid phase richer in lime than it was, previous to being added to the water. For material having a composition approximating closely that represented by the formula $\text{Ca}_3(\text{PO}_4)_2$, the amount which is dissolved by CO_2 free water at the ordinary temperature, as calculated from the calcium determination, is 0.01 to 0.10 gram per liter, depending upon the conditions of the experiment. Water saturated with CO_2 dissolves 0.15 to 0.30 gram per liter.

A list of references to papers on this subject is given by Cameron and Hurst — J. Am. Chem. Soc. 26, 903, '04; see also Cameron and Bell, *Ibid.* 27, 1512, '05.

CALCIUM PHOSPHATE (Dibasic) $\text{CaHPO}_4 \cdot 2\text{H}_2\text{O}$.

SOLUBILITY IN WATER.

(Cameron and Seidell — J. Am. Chem. Soc. 26, 1460, '04; see also Rindell — Compt. rend. 134, 112, '02; Magnanini — Gazz. chim. ital. 31, II, 544, '01.)

1 liter of CO_2 free water dissolves 0.136 gram CaHPO_4 at 25° .

1 liter of water sat. with CO_2 dissolves 0.561 gram CaHPO_4 at 25° .

SOLUBILITY OF DI CALCIUM PHOSPHATE AND OF MONO CALCIUM PHOSPHATE IN AQUEOUS SOLUTIONS OF PHOSPHORIC ACID AT 25° .

(Cameron and Seidell — J. Am. Chem. Soc. 27, 1508, '05; Causse — Compt. rend. 114, 414, '02.)

| Grams per Liter of Solution. | | Gms. per Liter Calc. from CaO Found. | | P_2O_5 per Liter in Excess of that combined with Ca . | Solid Phase. |
|------------------------------|--------------------------|---|-------------------------------|--|--|
| CaO . | P_2O_5 . | | | | |
| 1.71 | 4.69 | 4.15 | CaHPO_4 | 2.53 | $\text{CaHPO}_4 \cdot 2\text{H}_2\text{O}$ |
| 11.57 | 36.14 | 28.05 | " | 21.5 | " |
| 23.31 | 75.95 | 56.53 | " | 46.45 | " |
| 39.81 | 139.6 | 97.01 | " | 89.0 | " |
| 49.76 | 191.0 | 120.7 | " | 128.0 | " |
| 59.40 | 234.6 | 144.1 | " | 159.4 | " |
| 70.31 | 279.7 | 170.6 | " | 190.7 | " |
| 77.00 | 317.0 | { 174.2 | CaHPO_4 or | 226.0 | $\text{CaHPO}_4 \cdot 2\text{H}_2\text{O} +$ |
| | | { 321.3 | $\text{CaH}_2(\text{PO}_4)_2$ | 122.2 | $\text{CaH}_2(\text{PO}_4)_2 \cdot \text{H}_2\text{O}$ |
| 72.30 | 351.9 | 301.6 | $\text{CaH}_2(\text{PO}_4)_2$ | 169.0 | $\text{CaH}_2(\text{PO}_4)_2 \cdot \text{H}_2\text{O}$ |
| 69.33 | 361.1 | 289.3 | " | 186.1 | " |
| 59.98 | 419.7 | 250.2 | " | 267.9 | " |
| 53.59 | 451.7 | 223.7 | " | 316.1 | " |
| 44.52 | 505.8 | 185.8 | " | 393.1 | " |
| 39.89 | 538.3 | 166.4 | " | 437.4 | " |

Density of the solution in contact with both salts at $25^\circ = 1.29$.

SOLUBILITY OF DI CALCIUM PHOSPHATE IN AQUEOUS N/200 SOLUTION OF ACID POTASSIUM TARTRATE AT 25° .

(Magnanini.)

1 liter of the solution contains 0.08 gram $\text{Ca} = 0.235$ gram CaHPO_4 .

CALCIUM PHOSPHATE (Monobasic) $\text{CaH}_2(\text{PO}_4)_2 \cdot \text{H}_2\text{O}$.

SOLUBILITY IN WATER.

This salt is stable in contact with the aqueous solution only when there is present free phosphoric acid to the extent indicated by the above table.

CALCIUM PELARGONATE (Nonate) $\text{Ca}[\text{CH}_2(\text{CH}_2)_7\text{COO}]_2 \cdot \text{H}_2\text{O}$.

CALCIUM PROPIONATE $\text{Ca}(\text{CH}_3\text{CH}_2\text{COO})_2 \cdot \text{H}_2\text{O}$.

SOLUBILITY OF EACH IN WATER.

(Lumsden — J. Chem. Soc. 81, 355, '02; Krasnicki — Monatsh. Chem. 8, 597, '87.)

Calcium Pelargonate.

| t° . | Grams $\text{Ca}[\text{CH}_2(\text{CH}_2)_7\text{COO}]_2$ per 100 Grams H_2O . | |
|-------------|--|--|
| | | |
| 0 | 0.16 | |
| 20 | 0.14 | |
| 40 | 0.13 | |
| 60 | 0.12 | |
| 80 | 0.15 | |
| 90 | 0.18 | |
| 100 | 0.26 | |

Calcium Propionate.

| Grams $\text{Ca}(\text{CH}_3\text{CH}_2\text{COO})_2$ per 100 Grams. | |
|--|-----------|
| Water. | Solution. |
| 42.80 | 29.97 |
| 39.85 | 28.48 |
| 38.45 | 27.76 |
| 38.25 | 27.67 |
| 39.85 | 28.48 |
| 42.15 | 29.66 |
| 48.44 | 32.63 |

CALCIUM SELENATE CaSeO_4 .

SOLUBILITY IN WATER.

(Etdard — Ann. chim. phys. [7] 2, 532, '94.)

| t°. | -1°. | +5°. | 20°. | 37°. | 67°. |
|------------------------|------|------|------|------|------|
| Gms. per 100 gms. sol. | 7.4 | 7.3 | 7.6 | 6.8 | 5.1 |

The accuracy of these results appears questionable.

CALCIUM SILICATE CaSiO_3 .

SOLUBILITY IN WATER AND IN AQUEOUS SUGAR SOLUTIONS AT 17°.

(Weisberg — Bull. soc. chim. [3] 15, 1097, '96.)

The sample of calcium silicate was air dried.

| Solvent. | Grams per 100 cc. Saturated Solution. | | | |
|----------------|---------------------------------------|----------------------------|----------------------------------|----------------------------|
| | At 17°. | | After Boiling and Filtering Hot. | |
| | CaO(det.) | CaSiO ₃ (calc.) | CaO(det.) | CaSiO ₃ (calc.) |
| Water | 0.0046 | 0.0095 | ... | ... |
| 10% sugar sol. | 0.0065 | 0.0135 | 0.0094 | 0.0195 |
| 20% sugar sol. | 0.0076 | 0.0157 | 0.0120 | 0.0249 |

CALCIUM SUCCINATE $\text{Ca}(\text{C}_2\text{H}_3\text{O}_2)_2$.**CALCIUM (Iso) SUCCINATE** $\text{CaCH}_3\text{CHC}_2\text{O}_4\cdot\text{H}_2\text{O}$.

SOLUBILITY OF EACH IN WATER.

(Miczynski — Monatsch. Chem. 7, 261, '86.)

| Calcium Succinate. | | | Calcium Iso Succinate. | | |
|--------------------|--|-----|--|-----|--|
| t°. | Gms. $\text{Ca}(\text{C}_2\text{H}_3\text{O}_2)_2$ per 100 Gms. H_2O . | t°. | Gms. $\text{Ca}(\text{C}_2\text{H}_3\text{O}_2)_2$ per 100 Gms. H_2O . | t°. | Gms. $\text{Ca}(\text{C}_2\text{H}_3\text{O}_2)_2$ per 100 Gms. H_2O . |
| 0 | 1.127 | 50 | 1.029 | 0 | 0.522 |
| 10 | 1.220 | 60 | 0.894 | 10 | 0.524 |
| 20 | 1.276 | 70 | 0.770 | 20 | 0.517 |
| 40 | 1.177 | 80 | 0.657 | 40 | 0.475 |
| | | | | 50 | 0.440 |
| | | | | 60 | 0.396 |
| | | | | 70 | 0.342 |
| | | | | 80 | 0.279 |

100 cc. H_2O dissolve 1.424 grams succinate ($\text{CaC}_4\text{H}_4\text{O}_4\cdot\text{H}_2\text{O}$) at 18°, and 1.436 grams at 25°.100 cc. 95% alcohol dissolve 0.00136 gram succinate ($\text{CaC}_4\text{H}_4\text{O}_4\cdot\text{H}_2\text{O}$) at 18°, and 0.00136 gram at 25°.

(Partheil and Hübner — Archiv. Pharm. 241, 413, '03.)

CALCIUM SULPHATE $\text{CaSO}_4\cdot 2\text{H}_2\text{O}$.

SOLUBILITY IN WATER.

(Hulett and Allen — J. Am. Chem. Soc. 24, 674, '02; for references to other determinations see Hulett and Allen, also Euler — Z. physik. Chem. 49, 313, '04. Determinations by the electrolytic conductivity method Holleman, Kohlrausch and Rose — Z. physik. Chem. 12, 129, 241, '93.)

| t°. | Gms. CaSO_4 per 100 cc. Solution. | Millimols. per Liter. | Density of Solutions. | t°. | Gms. CaSO_4 per 100 cc. Solution. | Millimols. per Liter. | Density of Solutions. |
|-----|--|-----------------------|-----------------------|------|--|-----------------------|-----------------------|
| 0 | 0.1759 | 12.926 | 1.00197 | 40 | 0.2097 | 15.413 | 0.99439 |
| 10 | 0.1928 | 14.177 | 1.00173 | 55 | 0.2009 | 14.765 | 0.98796 |
| 18 | 0.2016 | 14.817 | 1.00059 | 65.3 | 0.1932 | 14.200 | 0.98256 |
| 25 | 0.2080 | 15.295 | 0.99911 | 75 | 0.1847 | 13.575 | 0.97772 |
| 30 | 0.2090 | 15.361 | 0.99789 | 100 | 0.1619 | 11.900 | ... |
| 35 | 0.2096 | 15.405 | 0.99789 | 107 | ... | 11.390 | ... |

SOLUBILITY OF CALCIUM SULPHATE IN AQUEOUS SOLUTIONS OF HYDROCHLORIC, NITRIC, CHLOR ACETIC, AND FORMIC ACIDS.

(Banthisch — J. pr. Chem. 29, 52, '84; Lunge — J. Soc. Chem. Ind. 4, 32, '85.)

| Grams Acid per 100 cc. Solution. | In Hydrochloric. | | In Nitric. | | In Chlor Acetic. | | In Formic. | |
|---|---|----------|--|--|--|--|--|--|
| | Grams CaSO ₄ per 100 cc. Sol. | | Gms. CaSO ₄ per 100 cc. Solution | | Gms. CaSO ₄ per 100 cc. Sol. | | Gms. CaSO ₄ per 100 cc. Sol. | |
| | at 25°. | at 102°. | at 25°. | | at 25°. | | at 25°. | |
| 0 | 0.208 | 0.160 | 0.208 | | 0.208 | | 0.208 | |
| 1 | 0.72 | 1.38 | 0.56 | | ... | | ... | |
| 2 | 1.02 | 2.38 | 0.82 | | ... | | ... | |
| 3 | 1.25 | 3.20 | 1.02 | | ... | | ... | |
| 4 | 1.42 | 3.64 | 1.20 | | 0.22 | | 0.24 | |
| 6 | 1.65 | 4.65 | 1.48 | | ... | | ... | |
| 8 | 1.74 | ... | 1.70 | | ... | | ... | |
| 10 | ... | ... | 1.84 | | 0.25 | | ... | |
| 12 | ... | ... | 1.98 | | ... | | ... | |

SOLUBILITY OF CALCIUM SULPHATE IN AQUEOUS SOLUTIONS OF PHOSPHORIC ACID AT 25°.

(Taber — page 61, Bull. 33, Bureau of Soils — U. S. Dept. Agr., 1906.)

| Gms. per Liter. | Sp. Gr. of | | Gms. per Liter. | Sp. Gr. of | |
|-----------------|---------------------------------|---------------------|-----------------|---------------------------------|---------------------|
| | P ₂ O ₅ . | CaSO ₄ . | | P ₂ O ₅ . | CaSO ₄ . |
| 0.0 | 2.126 | 0.9991 | 145.1 | 7.920 | 1.106 |
| 5.0 | 3.143 | 1.002 | 205.0 | 8.383 | 1.145 |
| 10.5 | 3.734 | 1.007 | 311.5 | 7.965 | 1.221 |
| 21.4 | 4.456 | 1.016 | 395.8 | 6.848 | 1.280 |
| 46.3 | 5.760 | 1.035 | 494.6 | 5.572 | 1.344 |
| 105.3 | 7.318 | 1.075 | | | |

SOLUBILITY OF CALCIUM SULPHATE IN AQUEOUS SOLUTIONS OF SULPHURIC ACID.

(Cameron and Breazeale — J. Physic. Chem. 7, 574, '03.)

| Grams H ₂ SO ₄ per Liter of Solution. | Results at 25°. | | Results at 35°. | Results at 43°. |
|---|--------------------------------------|----------------------|--------------------------------------|--------------------------------------|
| | Gms. CaSO ₄ per Liter. | Wt. of 1 cc. Sol. | Gms. CaSO ₄ per Liter. | Gms. CaSO ₄ per Liter. |
| 0.00 | 2.126 | 0.9991 grams | ... | 2.145 |
| 0.48 | 2.128 | 1.0025 " | 2.209 | 2.236 |
| 4.87 | 2.144 | 1.0026 " | 2.451 | 2.456 |
| 8.11 | 2.203 | 1.0051 " | ... | 2.760 |
| 16.22 | 2.382 | 1.0098 " | ... | 3.116 |
| 48.67 | 2.727 | 1.0302 " | 3.397 | 3.843 |
| 75.00 | 2.841 | 1.0435 " | ... | 4.146 |
| 97.35 | 2.779 | 1.0756 " | 3.606 | ... |
| 146.01 | 2.571 | ... | 3.150 | 4.139 |
| 194.70 | 2.313 | 1.1134 " | ... | 3.551 |
| 243.35 | 1.901 | 1.1418 " | ... | 2.959 |
| 292.02 | 1.541 | 1.1681 " | ... | 2.481 |

SOLUBILITY OF CALCIUM SULPHATE IN AQUEOUS SOLUTIONS OF AMMONIUM SALTS.

(In NH_4Cl and NH_4NO_3 , Cameron and Brown — *J. Physic. Chem.* 9, 210, '05; In $(\text{NH}_4)_2\text{SO}_4$ at 25°, Sullivan — *J. Am. Chem. Soc.* 27, 529, '05; In $(\text{NH}_4)_2\text{SO}_4$ at 50°, Bell and Tabor — *J. Physic. Chem.* 10, 119, '06.)

| Gms. Ammonium Salt per Liter. | In NH_4Cl at 25°. | In NH_4NO_3 at 25°. | Gms. Ammonium Salt per Liter. | In NH_4Cl at 25°. | In NH_4NO_3 at 25°. |
|-------------------------------|---|---|-------------------------------|---|---|
| | G. CaSO_4 Dissolved per Liter. | G. CaSO_4 Dissolved per Liter. | | G. CaSO_4 Dissolved per Liter. | G. CaSO_4 Dissolved per Liter. |
| 0 | 2.08 | 2.08 | 300 | 10.10 | 10.80 |
| 20 | 5.00 | 3.70 | 375 | 7.40 | ... |
| 40 | 7.00 | 5.10 | 400 | ... | 11.40 |
| 60 | 8.00 | 6.05 | 600 | ... | 12.15 |
| 80 | 8.50 | 7.00 | 800 | ... | 12.10 |
| 100 | 9.10 | 7.65 | 1000 | ... | 11.81 |
| 150 | 10.30 | 8.88 | 1400 | ... | 10.02 |
| 200 | 10.85 | 9.85 | sat. | ... | 7.55 |

| In $(\text{NH}_4)_2\text{SO}_4$ at 25°. | | | In $(\text{NH}_4)_2\text{SO}_4$ at 50°. | | |
|---|-------------------|--------------------------|---|-------------------|-----------------------|
| Grams per Liter Sol. | | Wt. of 100 cc. Sat. Sol. | Grams per Liter Sol. | | Sp. Gr. of Solutions. |
| $(\text{NH}_4)_2\text{SO}_4$. | CaSO_4 . | | $(\text{NH}_4)_2\text{SO}_4$. | CaSO_4 . | |
| 0.00 | 0.208 | 99.91 | 0.00 | 2.168. | ... |
| 0.129 | 0.204 | 99.91 | 15.65 | 1.609 | 1.0026 |
| 0.258 | 0.199 | 99.92 | 30.67 | 1.750 | 1.0113 |
| 0.821 | 0.181 | 99.95 | 91.6 | 2.542 | 1.0440 |
| 1.643 | 0.166 | 99.99 | 160.4 | 3.402 | 1.0819 |
| 3.287 | 0.154 | 100.10 | 221.6 | 4.068 | 1.1108 |
| 6.575 | 0.144 | 100.34 | 340.6 | 5.084 | 1.1653 |
| 13.15 | 0.146 | 100.82 | 416.5 | 5.354 | 1.1964 |
| 26.30 | 0.162 | 101.76 | 428.4 | 4.632 | 1.2043 |
| 84.9 | 0.233 | 105.34 | 530.8 | 2.152 | 1.2437 |
| 169.8 | 0.333 | 110.32 | 566.0 | 1.08 | 1.2508 |
| 339.6 | 0.450 | 119.15 | 566.7 | 0.00 | 1.2510 |

SOLUBILITY OF CALCIUM SULPHATE IN AQUEOUS SOLUTIONS OF CALCIUM SALTS AT 25°.

(Cameron and Seidell — *J. Physic. Chem.* 5, 643, '01; Seidell and Smith — *Ibid.* 8, 493, '04; Cameron and Bell — *J. Am. Chem. Soc.* 28, 1220, '06.)

| In Calcium Chloride. | | In Calcium Nitrate. | | Wt. of 1 cc. Sol. | In Calcium Hydroxide and <i>vice versa</i> . | | Solid Phase. |
|----------------------|-------------------|------------------------------|-------------------|-------------------|--|-------------------|--|
| Grams per Liter Sol. | | Gms. per Liter Sol. | | | Gms. per Liter Sol. | | |
| CaCl_2 . | CaSO_4 . | $\text{Ca}(\text{NO}_3)_2$. | CaSO_4 . | | CaO . | CaSO_4 . | |
| 0.00 | 2.06 | 0.0 | 2.08 | 0.998 | 0.0 | 2.126 | $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ |
| 7.49 | 1.24 | 25 | 1.24 | 1.014 | 0.062 | 2.030 | " |
| 11.96 | 1.18 | 50 | 1.20 | 1.032 | 0.176 | 1.918 | " |
| 25.77 | 1.10 | 100 | 1.13 | 1.067 | 0.349 | 1.853 | " |
| 32.05 | 1.08 | 200 | 0.93 | 1.137 | 0.61 | 1.722 | " |
| 51.53 | 1.02 | 300 | 0.76 | 1.204 | 0.939 | 1.634 | " |
| 97.02 | 0.84 | 400 | 0.57 | 1.265 | 1.222 | 1.588 | $\left\{ \begin{array}{l} \text{CaSO}_4 \cdot 2\text{H}_2\text{O} + \\ \text{Ca}(\text{OH})_2 \\ \text{Ca}(\text{OH})_2 \end{array} \right.$ |
| 192.71 | 0.47 | 500 | 0.40 | 1.328 | 1.242 | 1.214 | |
| 280.30 | 0.20 | 544 | 0.35 | 1.352 | 1.150 | 0.666 | |
| 367.85 | 0.03 | ... | ... | ... | 1.166 | 0.00 | |

SOLUBILITY OF CALCIUM SULPHATE IN AQUEOUS SOLUTIONS OF
MAGNESIUM CHLORIDE AND OF MAGNESIUM NITRATE AT 25°.

(Cameron, Seidell, and Smith.)

In Magnesium Chloride.

| Grams per Liter of Sat. Solution. | | |
|-----------------------------------|---------------------|-------------------|
| MgCl ₂ . | CaSO ₄ . | H ₂ O. |
| 0.0 | 2.08 | 997.9 |
| 8.50 | 4.26 | 996.5 |
| 19.18 | 5.69 | 994.5 |
| 46.64 | 7.59 | 989.1 |
| 121.38 | 8.62 | 972.2 |
| 206.98 | 6.57 | 949.9 |
| 337.0 | 2.77 | 908.7 |
| 441.1 | 1.39 | 878.6 |

In Magnesium Nitrate.

| Gms. per Liter Sol. | | Wt. of 1 cc. Solution. |
|-------------------------------------|---------------------|---------------------------|
| Mg(NO ₃) ₂ . | CaSO ₄ . | |
| 0.0 | 2.08 | 0.9981 |
| 25 | 5.77 | 1.0205 |
| 50 | 7.88 | 1.0398 |
| 100 | 9.92 | 1.0786 |
| 200 | 13.34 | 1.1498 |
| 300 | 14.00 | 1.2190 |
| 400 | 14.68 | 1.2821 |
| 514 | 15.04 | 1.3553 |

SOLUBILITY OF CALCIUM SULPHATE IN AQUEOUS SOLUTIONS OF MAG-
NESIUM SULPHATE AT 25°.

(Cameron and Bell — J. Physic. Chem. 10, 210, '06.)

| Grams per Liter Solution. | | Sp. Gr. of Solutions at 15°. | Grams per Liter Solution. | | Sp. Gr. of Solutions at 15°. |
|---------------------------|---------------------|---------------------------------|---------------------------|---------------------|---------------------------------|
| MgSO ₄ . | CaSO ₄ . | | MgSO ₄ . | CaSO ₄ . | |
| 0.0 | 2.046 | 1.0032 | 149.67 | 1.597 | 1.1377 |
| 3.20 | 1.620 | 1.0055 | 165.7 | 1.549 | 1.1479 |
| 6.39 | 1.507 | 1.0090 | 171.2 | 1.474 | 1.1537 |
| 10.64 | 1.471 | 1.0118 | 198.8 | 1.422 | 1.1813 |
| 21.36 | 1.478 | 1.0226 | 232.1 | 1.254 | 1.2095 |
| 42.68 | 1.558 | 1.0419 | 265.6 | 1.070 | 1.2382 |
| 64.14 | 1.608 | 1.0626 | 298.0 | 0.860 | 1.2624 |
| 85.67 | 1.617 | 1.0833 | 330.6 | 0.647 | 1.2877 |
| 128.28 | 1.627 | 1.1190 | 355.0 | 0.501 | 1.3023 |

SOLUBILITY OF CALCIUM SULPHATE IN AQUEOUS SOLUTIONS OF POTAS-
SIUM CHLORIDE, BROMIDE, AND IODIDE AT 21°.

(Ditte — Ann. chim. phys. [7] 14, 294, '98.)

In KCl Solutions. In KBr Solutions. In KI Solutions.

| Grams of the Potassium Salt per Liter. | Gms. CaSO ₄ per Liter. | Gms. CaSO ₄ per Liter. | Gms. CaSO ₄ per Liter. |
|--|--------------------------------------|--------------------------------------|--------------------------------------|
| 0 | 2.05 | 2.05 | 2.05 |
| 10 | 3.6 | 3.1 | 2.8 |
| 20 | 4.5 | 3.6 | 3.2 |
| 40 | 5.8 | 4.5 | 3.9 |
| 60 | 6.6 | 5.2 | 4.5 |
| 80 | 7.2 | 5.9 | 4.85 |
| 100 | 7.5 | 6.3 | 5.1 |
| 125 | double salt | 6.7 | 5.45 |
| 150 | ... | 7.0 | 5.8 |
| 200 | ... | 7.3 | 5.95 |
| 250 | ... | double salt | 6.00 |
| 300 | ... | ... | double salt |

SOLUBILITY OF CALCIUM SULPHATE IN AQUEOUS SOLUTIONS OF POTASSIUM NITRATE AND OF POTASSIUM SULPHATE AT 25°.

(Seidell and Smith — J. Physic. Chem. 8, 493, '04; Cameron and Breazeale — *Ibid.* 8, 335, '04.)

| In Potassium Nitrate. | | | In Potassium Sulphate. | | |
|--------------------------|---------------------|------------------------|----------------------------------|---------------------|------------------------|
| Gms. per Liter Solution. | | Wt. of 1 cc. Solution. | Gms. per Liter Solution. | | Wt. of 1 cc. Solution. |
| KNO ₃ . | CaSO ₄ . | | K ₂ SO ₄ . | CaSO ₄ . | |
| 0.0 | 2.08 | 0.9981 | 0.0 | 2.08 | 0.9981 |
| 12.5 | 3.28 | 1.0081 | 4.88 | 1.60 | 1.0036 |
| 25.0 | 4.08 | 1.0154 | 5.09 | 1.56 | 1.0038 |
| 50.0 | 5.26 | 1.0321 | 9.85 | 1.45 | 1.0075 |
| 100.0 | 6.86 | 1.0625 | 19.57 | 1.49 | 1.0151 |
| 150 | 7.91 | 1.0924 | 28.35 | 1.55 | 1.0229 |
| 200 | 8.69 | 1.1224 | 30.66 | 1.57 | 1.0236 |
| 260 | syngenite | 1.1539 | 32.47 | 1.58* | ... |

* Solid phase syngenite. Results for the solubility of syngenite in solutions of potassium sulphate are also given in the original paper.

SOLUBILITY OF CALCIUM SULPHATE IN AQUEOUS SOLUTIONS OF SODIUM CHLORIDE AT 26°.

(Cameron — J. Physic. Chem. 5, 556, '01; see this paper for references to other work, also Orloff — J. russ. phys. chem. Ges. 37, 949, '02; Cloez — Bull. soc. chim. [3] 29, 167, '03; d'Anselme — *Ibid.* [3] 29, 372, '03.)

| Grams per 100 cc. Solution. | | Wt. of 1 cc. Solution. | Grams per 100 cc. Solution. | | Wt. of 1 cc. Solution. |
|-----------------------------|---------------------|------------------------|-----------------------------|---------------------|------------------------|
| NaCl. | CaSO ₄ . | | NaCl. | CaSO ₄ . | |
| 0.00 | 0.2121 | 0.9998 | 17.650 | 0.712 | 1.1196 |
| 9.115 | 0.666 | 1.0644 | 22.876 | 0.679 | 1.1488 |
| 14.399 | 0.718 | 1.0981 | 26.417 | 0.650 | 1.1707 |
| 14.834 | 0.716 | 1.1012 | 32.049 | 0.572 | 1.2034 |

SOLUBILITY OF MIXTURES OF CALCIUM SULPHATE AND CALCIUM CARBONATE IN AQUEOUS SOLUTIONS OF SODIUM CHLORIDE AT 23°.

(Cameron and Seidell — J. Physic. Chem. 5, 643, '01.)

| Grams per Liter Solution. | | | Grams per Liter Solution. | | |
|---------------------------|--------------------------------------|---------------------|---------------------------|--------------------------------------|---------------------|
| NaCl. | Ca(HCO ₃) ₂ . | CaSO ₄ . | NaCl. | Ca(HCO ₃) ₂ . | CaSO ₄ . |
| 0.00 | 0.060 | 1.930 | 79.52 | 0.060 | 6.424 |
| 3.63 | 0.072 | 2.720 | 121.90 | 0.056 | 5.272 |
| 11.49 | 0.089 | 3.446 | 193.80 | 0.048 | 4.786 |
| 39.62 | 0.101 | 5.156 | 267.60 | 0.040 | 4.462 |

SOLUBILITY OF MIXTURES OF CALCIUM SULPHATE AND SILVER SULPHATE IN WATER.

(Euler — Z. physik. Chem. 49, 313, '04.)

| t°. | Per Liter of Solution. | | Total Salt per 100 Gms. Solution. | Sp. Gr. of Solutions. |
|-------|---------------------------------|----------------------|---|--------------------------|
| | Gms. Salt. | Gms. Equiv. Salt. | | |
| 17° { | CaSO ₄ | 2.31 | 0.9473 | 1.0083 |
| | Ag ₂ SO ₄ | 7.235 | | |
| 25° { | CaSO ₄ | 2.61 | 1.062 | 1.010 |
| | Ag ₂ SO ₄ | 8.11 | | |

CALCIUM SULPHATE

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SOLUBILITY OF CALCIUM SULPHATE IN AQUEOUS SOLUTIONS OF SODIUM NITRATE AND OF SODIUM SULPHATE AT 25°.

(Seidell, Smith, Cameron, Breazeale.)

| In Sodium Nitrate. | | | In Sodium Sulphate. | | |
|---------------------------|---------------------|------------------------|-----------------------------------|---------------------|------------------------|
| Grams per Liter Solution. | | Wt. of 1 cc. Solution. | Grams per Liter Solution. | | Wt. of 1 cc. Solution. |
| NaNO ₃ . | CaSO ₄ . | | Na ₂ SO ₄ . | CaSO ₄ . | |
| 0 | 2.08 | 0.9981 | 2.39 | 1.65 | 1.0013 |
| 25 | 4.25 | 1.0163 | 9.54 | 1.45 | 1.0076 |
| 50 | 5.50 | 1.0340 | 14.13 | 1.39 | 1.0115 |
| 100 | 7.10 | 1.0684 | 24.37 | 1.47 | 1.0205 |
| 200 | 8.79 | 1.1336 | 46.15 | 1.65 | 1.0391 |
| 300 | 9.28 | 1.1916 | 115.08 | 2.10 | 1.0965 |
| 600 | 7.89 | 1.3639 | 146.61 | 2.23 | 1.1427 |
| 655 | 7.24 | 1.3904 | 257.10 | 2.65 | 1.2120 |

SOLUBILITY OF CALCIUM SULPHATE IN AQUEOUS AND ALCOHOLIC MONO POTASSIUM TARTRATE SOLUTIONS AT 20°.

(Magnanini — Gazz. chim. ital. 31, II, 544, '01.)

| Solvent. | Gms. CaSO ₄ per 100 Gms. Solution. | Solvent. | Gms. CaSO ₄ per 100 Gms. Solution. |
|--|---|---|---|
| Water | 0.2238 | 10% alcoholic N/200 KHC ₄ H ₄ O ₆ | 0.0866 |
| Aq. N/200 KHC ₄ H ₄ O ₆ | 0.2323 | Aq. N/200 KHC ₄ H ₄ O ₆ + 5% tartaric ac. | 0.2566 |
| 10 per cent alcohol | 0.0970 | 10% alc. N/400 KHC ₄ H ₄ O ₆ + 5% tartaric ac. | 0.1086 |

SOLUBILITY OF CALCIUM SULPHATE IN AQUEOUS SUGAR SOLUTIONS.

(Stolle — Z. Ver. Zuckerind. 50, 331, '00.)

| Per cent Concentration of Sugar Solutions. | Grams CaSO ₄ Dissolved by 1 Liter of the Sugar Solutions at: | | | | | |
|--|---|-------|-------|-------|-------|-------|
| | 30°. | 40°. | 50°. | 60°. | 70°. | 80°. |
| 0 | ... | 2.157 | 1.730 | 1.730 | 1.652 | 1.710 |
| 10 | 2.041 | 1.730 | 1.730 | 1.574 | 1.574 | 1.613 |
| 20 | 1.808 | 1.652 | 1.419 | 1.380 | 1.419 | 1.263 |
| 27 | 1.550 | 1.438 | 1.361 | 1.283 | 1.283 | 0.972 |
| 35 | 1.263 | 1.050 | 1.088 | 1.108 | 0.914 | ... |
| 42 | 1.030 | ... | 0.777 | 0.816 | 0.855 | 0.729 |
| 49 | ... | 0.564 | 0.739 | 0.564 | 0.603 | 0.486 |
| 55 | ... | 0.486 | 0.505 | 0.486 | 0.369 | 0.330 |

CALCIUM SULPHIDE CaS.

SOLUBILITY IN AQUEOUS SUGAR SOLUTIONS.

(Stolle.)

| Per cent Concentration of Sugar Solutions. | Grams CaS Dissolved per Liter of the Sugar Solutions at: | | | | | | |
|--|--|-------|-------|-------|-------|-------|-------|
| | 30°. | 40°. | 50°. | 60°. | 70°. | 80°. | 90°. |
| 0 | 1.982 | 2.123 | 1.235 | 1.390 | 1.696 | 2.032 | 2.496 |
| 10 | 1.866 | 1.316 | 1.441 | 1.673 | 1.560 | 1.634 | 1.544 |
| 20 | 2.187 | 1.696 | 1.802 | 1.905 | 1.879 | 1.892 | 1.930 |
| 27 | 2.522 | 2.097 | 2.059 | 2.226 | 2.342 | 2.304 | 2.357 |
| 35 | 2.689 | 2.265 | 2.304 | 2.406 | 2.342 | 2.857 | 2.947 |
| 42 | 2.342 | 2.136 | 2.226 | 2.522 | 2.574 | 2.509 | 2.689 |
| 49 | 2.445 | 2.290 | 2.458 | 2.638 | 2.728 | 2.818 | 3.063 |
| 55 | 2.509 | 2.226 | 2.340 | 2.882 | 2.766 | 2.972 | 3.616 |

CALCIUM SULPHITE CaSO_3 .

SOLUBILITY IN WATER AND IN AQUEOUS SUGAR SOLUTIONS AT 18°.
(Weisberg — Bull. soc. chim. [3] 15, 1097, '96.)

| Solvent. | Grams CaSO_3 per 100 cc. Solution. | |
|-------------------|---|------------------------------------|
| | At 18°. | After Boiling Solution 2 Hours. |
| Water | 0.0043 | ... |
| 10 Per cent Sugar | 0.0083 | 0.0066 |
| 30 Per cent Sugar | 0.0080 | 0.0069 |

CALCIUM TARTRATE $\text{CaC}_4\text{H}_4\text{O}_6 \cdot 4\text{H}_2\text{O}$.

SOLUBILITY IN WATER.

(Cantoni and Zachoder — Bull. soc. chim. [3] 33, 767, '05.)

| g. | Gms. $\text{CaC}_4\text{H}_4\text{O}_6 \cdot 4\text{H}_2\text{O}$ per 100 cc. Sol. | g. | Gms. $\text{CaC}_4\text{H}_4\text{O}_6 \cdot 4\text{H}_2\text{O}$ per 100 cc. Sol. | g. | Gms. $\text{CaC}_4\text{H}_4\text{O}_6 \cdot 4\text{H}_2\text{O}$ per 100 cc. Sol. |
|----|---|----|---|----|---|
| 0 | 0.0365 | 30 | 0.0631 | 70 | 0.1430 |
| 10 | 0.0401 | 40 | 0.0875 | 80 | 0.1798 |
| 20 | 0.0475 | 50 | 0.1100 | 85 | 0.2190 |
| 25 | 0.0525 | 60 | 0.1262 | | |

100 gms. aq. Ca. tartrate solution contain 0.0185 g. $\text{CaC}_4\text{H}_4\text{O}_6 \cdot 4\text{H}_2\text{O}$ at 18°, and 0.029489 at 25°.

100 gms. 95% alcohol solution contain 0.0187 g. $\text{CaC}_4\text{H}_4\text{O}_6 \cdot 4\text{H}_2\text{O}$ at 18°, and 0.02352 at 25°.

(Parthell and Hübner — Archiv. Pharm. 241, 413, '03.)

100 gms. aq. Ca. tartrate solution contain 0.0364 g. $\text{CaC}_4\text{H}_4\text{O}_6$ at 20°.

100 gms. 10% alcohol solution contain 0.0160 g. $\text{CaC}_4\text{H}_4\text{O}_6$ at 20°.

100 gms. 10% alcohol + 5% tartaric acid solution contain 0.1632 g. $\text{CaC}_4\text{H}_4\text{O}_6$ at 20°.

(Magnanini — Gazz. chim. ital. 31, II, 544, '01.)

SOLUBILITY OF CALCIUM TARTRATE IN AQUEOUS ACETIC ACID

SOLUTIONS AT 26°-27°.

(Herz and Muhs — Ber. 36, 3715, '03; see also Enell — Pharm. Centrallh. 38, 181; Z. anal. Chem. 38, 368, '99.)

| Normality of Acetic Acid. | Gms. CH_3COOH per 100 cc. Sol. | Residue from 50.052 cc. Sol. | Normality of Acetic Acid. | Gms. CH_3COOH per 100 cc. Sol. | Residue from 50.052 cc. Sol. |
|------------------------------|---|---------------------------------|------------------------------|---|---------------------------------|
| 0 | 0 | 0.0217 | 3.80 | 22.80 | 0.2042 |
| 0.57 | 3.42 | 0.1082 | 5.70 | 34.20 | 0.1844 |
| 1.425 | 8.55 | 0.1635 | 10.09 | 60.54 | 0.1160 |
| 2.85 | 17.10 | 0.1970 | 16.505 | 93.03 | 0.0337 |

The residue was dried at 70° C.

CALCIUM BITARTRATE $\text{CaH}_2(\text{C}_4\text{H}_4\text{O}_6)_2$.

SOLUBILITY IN WATER AND IN AQUEOUS SOLUTIONS OF ACIDS AND OF SALTS.

(Warington — J. Chem. Soc. 28, 946, '75.)

In Hydrochloric Acid.

In other Acids and in Salt Solutions at 14°.

| Conc. of HCl Gms. per 100 Gms. Sol. | Gms. $\text{CaH}_2(\text{C}_4\text{H}_4\text{O}_6)_2$ per 100 Gms. Solvent. | | Acid or Salt. | Gms. Acid or Salt per 100 cc. Sol. | Gms. $\text{CaH}_2(\text{C}_4\text{H}_4\text{O}_6)_2$ per 100 cc. Sol. |
|---|--|---------|-------------------|---------------------------------------|---|
| | At 22°. | At 80°. | | | |
| 0 | 0.600 | 4.027 | Acetic Acid | 0.81 | 0.422 |
| 0.68 | 3.01 | 5.35 | Tartaric Acid | 1.03 | 0.322 |
| 2.15 | 6.88 | 11.35 | Citric Acid | 0.84 | 0.546 |
| 4.26 | 11.19 | 20.23 | Sulphuric Acid | 0.685 | 1.701 |
| 8.36 | 22.75 | 40.93 | Hydrochloric Acid | 0.504 | 1.947 |
| 16.13 | 48.31 | 80.12 | Nitric Acid | 0.845 | 1.969 |
| | | | Potassium Acetate | 1.387 | 0.744 |
| | | | Potassium Citrate | 1.397 | 0.843 |

100 gms. H_2O dissolve 0.422 gms. bitartrate at 14°

CALCIUM VALERATE $\text{Ca}[\text{CH}_2(\text{CH}_2)_4\text{COO}]_2 \cdot \text{H}_2\text{O}$.**CALCIUM (Iso) VALERATE** $\text{Ca}[(\text{CH}_2)_3\text{CH}(\text{CH}_3)\text{COO}]_2 \cdot 3\text{H}_2\text{O}$.

SOLUBILITY OF EACH IN WATER.

(Lumsden — J. Chem. Soc. 81, 355, '02; see also Furth — Monatsh. Chem. 9, 313, '88; Sedlitzky — *Ibid.*, 8, 566, '87.)

| Calcium Valerate. | | | Calcium Iso Valerate. | | | |
|-------------------|--|-----------|-----------------------|--|-----------|---|
| t°. | Gms. $\text{Ca}(\text{C}_4\text{H}_9\text{O}_2)_2$ per 100 Gms. | | t°. | Gms. $\text{Ca}(\text{C}_4\text{H}_9\text{O}_2)_2$ per 100 Gms. | | Solid Phase. |
| | Water. | Solution. | | Water. | Solution. | |
| 0 | 9.82 | 8.94 | 0 | 26.05 | 20.66 | $\text{Ca}(\text{C}_5\text{H}_9\text{O}_2)_2 \cdot 5\text{H}_2\text{O}$ |
| 10 | 9.25 | 8.47 | 10 | 22.70 | 18.50 | " |
| 20 | 8.80 | 8.09 | 20 | 21.80 | 17.90 | " |
| 30 | 8.40 | 7.75 | 30 | 21.68 | 17.82 | " |
| 40 | 8.05 | 7.45 | 40 | 22.00 | 18.18 | " |
| 50 | 7.85 | 7.28 | 45.5 | 22.35 | 18.42 | " |
| 57 | 7.75 | 7.19 | 50 | 19.95 | 16.63 | $\text{Ca}(\text{C}_6\text{H}_9\text{O}_2)_2 \cdot \text{H}_2\text{O}$ |
| 60 | 7.78 | 7.22 | 60 | 18.38 | 15.52 | " |
| 70 | 7.80 | 7.24 | 70 | 17.40 | 14.82 | " |
| 80 | 7.95 | 7.36 | 80 | 16.88 | 14.44 | " |
| 90 | 8.20 | 7.58 | 90 | 16.65 | 14.28 | " |
| 100 | 8.78 | 8.07 | 100 | 16.55 | 14.20 | " |

CAOUTCHOUC.

SOLUBILITY IN ORGANIC SOLVENTS.

(Hanausek — J. pharm. chim. [5] 15, 509, '87.)

| Solvent. | Grams. Caoutchouc Dissolved per 100 Gms. Solvent. | | |
|-------------------|---|-------------|---------------|
| | Ceara. | Tete Noire. | Sierra Leone. |
| Ether | 2.5 | 3.6 | 4.5 |
| Turpentine | 4.5 | 5.0 | 4.6 |
| Chloroform | 3.0 | 3.7 | 3.0 |
| Petroleum | 1.5 | 4.5 | 4.0 |
| Benzene | 4.4 | 5.0 | 4.7 |
| Carbon Bisulphide | 0.4 | 0.0 | 0.0 |

CAMPHORIC ACID $\text{C}_8\text{H}_{14}(\text{COOH})_2$.100 grams of water dissolve 0.8 gram $\text{C}_8\text{H}_{14}(\text{COOH})_2$ at 25°, and 10 grams at the b. pt. (U.S.P.)**CARBAZOLE** (Di Phenylene imid) $(\text{C}_6\text{H}_4)_2\text{NH}$.100 grams abs. alcohol dissolve 0.92 gms. $(\text{C}_6\text{H}_4)_2\text{NH}$ at 14°, and 3.88 grams at b. pt.100 grams toluene dissolve 0.55 gm. $(\text{C}_6\text{H}_4)_2\text{NH}$ at 16.5°, and 5.46 grams at b. pt.**CARBAMIDES.**

SOLUBILITY IN SEVERAL SOLVENTS.

as Methyl Phenyl Carbamide (m. pt. 82°), Benzyl Carbamide (m. pt. 149°). o Toly Carbamide (m.pt. 185°) and p Toly Carbamide (m.pt. 173°).

(Walker and Wood — J. Chem. Soc. 73, 626, '98.)

| Solvent. | t°. | Grams Carbamide per 100 cc. Sat. Solution. | | | |
|----------|------|--|---------|---------|---------|
| | | as Methyl Phenyl. | Benzyl. | p Toly. | o Toly. |
| Water | 45 | 74 | 1.71 | 0.307 | 0.251 |
| Acetone | 23 | 29.4 | 3.10 | 2.66 | 0.462 |
| Ether | 22.5 | 2.28 | 0.053 | 0.062 | 0.0162 |
| Benzene | 44.2 | 12.4 | 0.0597 | 0.043 | 0.0155 |

CARBON DIOXIDE CO₂.**SOLUBILITY IN WATER AND IN AQUEOUS SODIUM CHLORIDE SOLUTIONS.**(Bohr — Wied. Ann. Physik. [3] 68, 503, '99; Geffcken — Z. physik. Chem. 49, 271, '04; Just — *Ibid.* 37, 354, '01.)

| t°. | Solubility in Water. | | | In 6.53% NaCl. | In 17.62% NaCl. |
|-----|----------------------|-------|-------|----------------|-----------------|
| | q. | β. | l. | β. | β. |
| 0 | 0.335 | 1.713 | ... | 1.234 | 0.678 |
| 5 | 0.277 | 1.424 | ... | 1.024 | 0.577 |
| 10 | 0.231 | 1.194 | ... | 0.875 | 0.503 |
| 15 | 0.197 | 1.019 | 1.070 | 0.755 | 0.442 |
| 20 | 0.169 | 0.878 | ... | 0.664 | 0.393 |
| 25 | 0.145 | 0.759 | 0.826 | 0.583 | 0.352 |
| 30 | 0.126 | 0.665 | ... | 0.517 | 0.319 |
| 40 | 0.097 | 0.530 | ... | 0.414 | 0.263 |
| 50 | 0.076 | 0.436 | ... | 0.370 | 0.235 |
| 60 | 0.058 | 0.359 | ... | 0.305 | 0.183 |

 q = wt. of gas dissolved by 100 grams of solvent at a total pressure of 760 mm. β = the **Bunsen Absorption Coefficient** which signifies the volume (v) of the gas (reduced to 0° and 760 mm.) taken up by unit volume (V) of the liquid when the pressure of the gas itself minus the vapor tension of the solvent is 760 mm.

$$\beta = \frac{v}{V(1 + 0.00367 t)}$$

 l = the **Ostwald Solubility Expression** which represents the ratio of the volume (v) of gas absorbed at any pressure and temperature, to the volume (V) of the absorbing liquid, i.e. $l = \frac{v}{V}$. This expression differs from theBunsen Absorption Coefficient, β , in that the volume (v) of the dissolved gas is not reduced to 0° and 760 mm. The solubility l is therefore the volume of gas dissolved by unit volume of the solvent at the temperature of the experiment. The two expressions are related thus:

$$l = \beta (1 + 0.00367 t), \quad \beta = \frac{l}{(1 + 0.00367 t)}$$

SOLUBILITY IN WATER AT PRESSURES ABOVE ONE ATMOSPHERE.

(Wroblewski — Compt. rend. 94, 1335, '82.)

| Pressure in Atmospheres. | Coefficient of Saturation * at: | | Pressure in Atmospheres. | Coefficient of Saturation * at: | |
|--------------------------|---------------------------------|--------|--------------------------|---------------------------------|--------|
| | 0°. | 12.4°. | | 0°. | 12.4°. |
| 1 | 1.797 | 1.086 | 20 | 21.65 | 17.11 |
| 5 | 8.65 | 5.15 | 25 | 30.55 | 20.31 |
| 10 | 16.03 | 9.65 | 30 | 33.74 | 23.25 |

* Coefficient of Absorption is no doubt intended.

SOLUBILITY OF CO₂ IN AQUEOUS SOLUTIONS OF ACIDS AND SALTS (Geffcken.)

| Aq. Solvent. | Gms. Acid per Liter. | CO ₂ Dissolved, l at: | | Aq. Solvent. | Gms. Salt per Liter. | CO ₂ Dissolved, l at: | |
|--------------------------------|----------------------|------------------------------------|-------|------------------|----------------------|------------------------------------|-------|
| | | 15°. | 25°. | | | 15°. | 25°. |
| HCl | 18.23 | 1.043 | 0.806 | CsCl | 84.17 | 1.006 | 0.781 |
| " | 36.46 | 1.028 | 0.799 | KCl | 37.30 | 0.976 | 0.759 |
| " | 72.92 | 1.000 | 0.795 | KCl | 74.60 | 0.897 | 0.700 |
| HNO ₃ | 31.52 | 1.078 | 0.840 | KI | 83.06 | 0.992 | 0.775 |
| " | 63.05 | 1.086 | 0.853 | KI | 166.12 | 0.923 | 0.727 |
| " | 126.10 | 1.100 | 0.877 | KBr | 59.55 | 0.986 | 0.768 |
| H ₂ SO ₄ | 24.52 | 1.018 | 0.794 | KBr | 119.11 | 0.914 | 0.713 |
| " | 49.04 | 0.978 | 0.770 | KNO ₃ | 50.59 | 1.005 | 0.784 |
| " | 98.08 | 0.917 | 0.730 | KNO ₃ | 101.19 | 0.946 | 0.749 |
| " | 147.11 | 0.870 | 0.698 | RbCl | 60.47 | 0.989 | 0.769 |
| " | 196.15 | 0.828 | 0.667 | RbCl | 120.95 | 0.921 | 0.788 |

SOLUBILITY IN AQUEOUS SOLUTIONS OF SALTS.

(Mackenzie — Wied. Ann. Physik. [2] 1, 450, '77.)

| Salt in Solution. | Gms. Salt per 100 Gms. Solution. | Density of Solution 15°. | Absorption Coefficient α at: | | |
|--------------------|----------------------------------|--------------------------|-------------------------------------|--------|-------|
| | | | 8°. | 15°. | 22°. |
| KCl | 6.05 | 1.021 | 0.988 | 0.777 | 0.670 |
| " | 8.646 | 1.053 | 0.918 | 0.777 | 0.649 |
| " | 11.974 | 1.080 | 0.864 | 0.720 | 0.597 |
| " | 22.506 | 1.549 | 0.688 | 0.571 | 0.480 |
| NaCl | 7.062 | 1.038 | 0.899 (6.4°) | 0.735 | ... |
| " | 12.995 | 1.080 | 0.633 (6.4°) | 0.557 | 0.482 |
| " | 17.42 | 1.123 | 0.518 (6.4°) | 0.431 | 0.389 |
| " | 26.00 | 1.195 | 0.347 (6.4°) | 0.297 | 0.263 |
| NH ₄ Cl | 6.465 | 1.021 | 1.023 | 0.825 | 0.718 |
| " | 8.723 | 1.047 | 1.000 | 0.791 | 0.702 |
| " | 12.727 | 1.053 | 0.922 | 0.798 | 0.684 |
| " | 24.233 | 1.072 | 0.813 (10°) | 0.738 | 0.600 |
| | | | 8°. | 16.5°. | 22°. |
| BaCl ₂ | 7.316 | 1.068 | 0.969 | 0.744 | 0.680 |
| " | 9.753 | 1.092 | 1.021 | 0.645 | 0.607 |
| " | 14.030 | 1.137 | ... | 0.618 | 0.524 |
| " | 25.215 | 1.273 | 0.495 | 0.618 | 0.383 |
| SrCl ₂ | 9.511 | 1.087 | 0.779 | 0.663 | 0.581 |
| " | 12.325 | 1.1159 | 0.737 | 0.586 | 0.507 |
| " | 17.713 | 1.173 | 0.606 | 0.473 | 0.444 |
| " | 31.194 | 1.343 | 0.285 | 0.245 | 0.247 |
| CaCl ₂ | 4.365 | 1.036 | 0.942 | 0.759 | 0.673 |
| " | 5.739 | 1.049 | 0.855 | 0.726 | 0.616 |
| " | 8.045 | 1.068 | 0.838 | 0.674 | 0.581 |
| " | 15.793 | 1.139 | 0.632 | 0.520 | 0.471 |
| | | | | 30°. | |
| | | | | 0.566 | |
| | | | | 0.543 | |
| | | | | 0.467 | |
| | | | | 0.315 | |
| | | | | 0.508 | |
| | | | | 0.539 | |
| | | | | 0.367 | |
| | | | | 0.223 | |
| | | | | 0.596 | |
| | | | | 0.527 | |
| | | | | 0.500 | |
| | | | | 0.400 | |

SOLUBILITY OF CARBON DIOXIDE IN ALCOHOL.

(Bohr — Wied. Ann. Physik [4] 1, 247, '00.)

| t°. | In 99 per cent Alcohol. | | In 98.7 per cent Alcohol. | |
|-----|--|----------------|--|----------------|
| | cc. CO ₂ (at 0° and 760 mm.) per 1 cc. Alcohol. | Sat. Solution. | cc. CO ₂ (at 0° and 760 mm.) per 1 cc. Alcohol. | Sat. Solution. |
| -65 | 38.41 | 35.93 | 39.89 | 37.22 |
| -20 | 7.51 | 7.41 | 7.25 | 7.16 |
| -10 | 5.75 | 5.69 | 5.43 | 5.38 |
| 0 | 4.44 | 4.40 | 4.35 | 4.31 |
| +10 | 3.57 | 3.55 | ... | ... |
| 20 | 2.98 | 2.96 | ... | ... |
| 25 | 2.76 | 2.74 | ... | ... |
| 30 | 2.57 | 2.56 | ... | ... |
| 40 | 2.20 | 2.19 | ... | ... |
| 45 | 2.01 | 2.00 | ... | ... |

SOLUBILITY IN AQUEOUS ALCOHOL AT 20°.

(Müller — Wied. Ann. Physik. [2] 37, 39, '89; Lubarsch — *Ibid.* [2] 37, 525, '89.)

| Density of Alcohol. | Per cent Alcohol By Wt. | Abs. Coef. of CO ₂ a. | Density of Alcohol. | Per cent Alcohol By Wt. | Abs. Coef. of CO ₂ a. |
|---------------------|-------------------------|----------------------------------|---------------------|-------------------------|----------------------------------|
| 0.908 | 1.07 | 0.861 | 0.922 | 49.0 | 0.982 |
| 0.969 | 22.76 | 0.841 | 0.870 (18.8°) | 71.1 | 1.293 |
| 0.960 (22.4°) | 28.46 | 0.792 | 0.835 (16°) | 85.3 | 1.974 |
| 0.956 | 31.17 | 0.801 | 0.795 (19°) | 99.7 | 2.719 |
| 0.935 (17°) | 42.15 | 0.877 | | | |

SOLUBILITY OF CARBON DIOXIDE IN ORGANIC SOLVENTS.

(Just — Z. physik. Chem. 37, 354, '01.)

| Solvent. | Sol. of CO ₂ , Ostwald Expression.* | | | Solvent. | Sol. of CO ₂ , Ostwald Expression.* | | |
|---|--|--------------------------|--------------------------|---------------------------------------|--|--------------------------|--------------------------|
| | <i>l</i> ₂₅ . | <i>l</i> ₃₀ . | <i>l</i> ₁₅ . | | <i>l</i> ₂₅ . | <i>l</i> ₃₀ . | <i>l</i> ₁₅ . |
| CS ₂ | 0.870 | 0.889 | 0.945 | C ₂ H ₅ OH | 2.498 | ... | ... |
| C ₆ H ₅ NH ₂ | 1.324 | 1.434 | 1.531 | C ₂ H ₅ OH(95%) | 2.706 | 2.923 | 3.130 |
| C ₆ H ₅ OH | 1.831 | 1.941 | 2.058 | C ₆ H ₅ COH | 2.841 | 3.057 | 3.304 |
| C ₆ H ₅ Br | 1.842 | 1.964 | 2.092 | CHCl ₃ | 3.430 | 3.681 | 3.958 |
| CCl ₄ | 2.294 | 2.502 | 2.603 | CH ₃ OH | 3.837 | 4.205 | 4.606 |
| C ₆ H ₅ CH ₃ | 2.305 | 2.426 | 2.557 | CH ₃ COOH | 4.691 | 5.129 | 5.614 |
| C ₆ H ₅ | 2.425 | 2.540 | 2.716 | (CH ₃ CO) ₂ O | 5.206 | 5.720 | 6.18 |
| C ₆ H ₅ NO ₂ | 2.456 | 2.655 | 2.845 | (CH ₃) ₂ CO | 6.295 | 6.921 | ... |

* See p. 105.

Determinations are also given for the solubility in glycerine, iod benzene, *o* and *m* toluidine, eugenol, benzene tri chloride, cumol, carvene, di chlor hydrine, iso butyl alcohol, benzyl chloride, meta xylol, ethylene bromide, chlor benzene, propylene bromide, amyl bromide, carvol, amyl chloride, iso butyl chloride, butyric acid, ethylene chloride, pyridine, amyl formate, propionic acid, amyl acetate, iso butyl acetate, and in methyl acetate.

See Woukoloff — Compt. rend. 108, 674; 109, 62, '89, for the solubility of CO₂ in CS₂ and CHCl₃ at different pressures.

CARBON MONOXIDE CO.

SOLUBILITY IN WATER.

(Winkler — Ber. 34, 1416, '01.)

| t°. | β, "Absorp. Coef." | β', "Solubility." | q. | t°. | β, "Absorp. Coef." | β', "Solubility." | q. |
|-----|--------------------|-------------------|--------|-----|--------------------|-------------------|--------|
| 0 | 0.03537 | 0.03516 | 0.0044 | 40 | 0.01775 | 0.01647 | 0.0021 |
| 5 | 0.03149 | 0.03122 | 0.0039 | 50 | 0.01615 | 0.01420 | 0.0018 |
| 10 | 0.02816 | 0.02782 | 0.0035 | 60 | 0.01488 | 0.01197 | 0.0015 |
| 15 | 0.02543 | 0.02501 | 0.0031 | 70 | 0.01440 | 0.00998 | 0.0013 |
| 20 | 0.02319 | 0.02266 | 0.0028 | 80 | 0.01430 | 0.00762 | 0.0010 |
| 25 | 0.02142 | 0.02076 | 0.0026 | 90 | 0.01420 | 0.00438 | 0.0006 |
| 30 | 0.01998 | 0.01915 | 0.0024 | 100 | 0.01410 | 0.00000 | 0.0000 |

β = vol. of CO absorbed by 1 volume of the liquid at a partial pressure of 760 mm. See page 105.

β' = vol. of CO (reduced to 0° and 760 mm.) absorbed by 1 volume of the liquid under a total pressure of 760 mm.

q = grams of CO dissolved by 100 grams H₂O at a total pressure of 760 mm.

SOLUBILITY OF CARBON MONOXIDE IN AQUEOUS ALCOHOL SOLUTIONS AT 20° AND 760 MM. PRESSURE.

(Lubarsch — Wied. Annalen Physik. [2] 37, 525, '89.)

| Wt. % Alcohol. | Vol. % Absorbed CO. | Wt. % Alcohol. | Vol. % Absorbed CO. |
|----------------|---------------------|----------------|---------------------|
| 0.00 | 2.41 | 28.57 | 1.50 |
| 9.09 | 1.87 | 33.33 | 1.94 |
| 16.67 | 1.75 | 50.00 | 3.20 |
| 23.08 | 1.68 | | |

SOLUBILITY OF CARBON MONOXIDE IN ORGANIC SOLVENTS.

(Just — Z. physik. Chem. 37, 361, '01.)

Results in terms of the Ostwald Solubility Expression, see p. 105.

| Solvent. | l_{25} . | l_{20} . | Solvent. | l_{25} . | l_{20} . |
|-------------------|------------|------------|-------------------|------------|------------|
| Water | 0.02404 | 0.02586 | Toluene | 0.1808 | 0.1742 |
| Anilin | 0.05358 | 0.05055 | Ethyl Alcohol | 0.1921 | 0.1901 |
| Carbon Disulphide | 0.08314 | 0.08112 | Chloroform | 0.1954 | 0.1897 |
| Nitro Benzene | 0.09366 | 0.09105 | Methyl Alcohol | 0.1955 | 0.1830 |
| Benzene | 0.1707 | 0.1645 | Amylacetate | 0.2140 | 0.2108 |
| Acetic Acid | 0.1714 | 0.1689 | Acetone | 0.2225 | 0.2128 |
| Amyl Alcohol | 0.1714 | 0.1706 | Iso Butyl Acetate | 0.2365 | 0.2314 |
| Xylene | 0.1781 | 0.1744 | Ethyl Acetate | 0.2516 | 0.2419 |

100 volumes of petroleum absorb 12.3 vols. CO at 20°, and 13.4 vols. at 10°.

(Guiewasz and Walfisz — Z. physik. Chem. 1, 70, '87.)

SOLUBILITY OF CARBON MONOXIDE IN MIXTURES OF ACETIC ACID AND OTHER SOLVENTS AT 25°.

(Skirrow — Z. physik. Chem. 41, 148, '02.)

Results in terms of the Ostwald Solubility Expression, see p. 105.

| Mixture of Acetic Ac. and: | % CH ₃ COOH in Mixture. | | CO. l_{25} . | Mixture of Acetic Ac. and: | % CH ₃ COOH in Mixture. | | CO. l_{25} . |
|-------------------------------|---------------------------------------|---------|-------------------|-------------------------------|---------------------------------------|---------|-------------------|
| | By Wt. | By Vol. | | | By Wt. | By Vol. | |
| Anilin | 100.0 | 100.0 | 0.173 | Chloroform | 56.4 | 64.5 | 0.196 |
| " | 86.5 | 90.8 | 0.110 | " | 0.0 | 0.0 | 0.206 |
| " | 58.3 | 68.5 | 0.070 | Nitro Benzene | 88.4 | 84.8 | 0.156 |
| " | 13.8 | 25.1 | 0.058 | " | 49.0 | 66.3 | 0.130 |
| " | 0.0 | 0.0 | 0.053 | " | 0.0 | 0.0 | 0.093 |
| Benzene | 67.5 | 63.4 | 0.199 | Toluene | 74.7 | 71.0 | 0.191 |
| " | 33.6 | 29.6 | 0.198 | " | 56.9 | 52.6 | 0.195 |
| " | 19.2 | 16.5 | 0.190 | " | 20.5 | 17.8 | 0.190 |
| " | 0.0 | 0.0 | 0.174 | " | 0.0 | 0.0 | 0.182 |

SOLUBILITY OF CARBON MONOXIDE IN MIXTURES OF ACETONE AND OTHER SOLVENTS AT 25°.

(Skirrow.)

| Mixture of Acetone and: | % (CH ₃) ₂ CO in Mixture. | | CO. lbs. | Mixture of Acetone and: | % (CH ₃) ₂ CO in Mixture. | | CO. lbs. |
|-------------------------|--|---------|----------|-------------------------|--|---------|----------|
| | By Wt. | By Vol. | | | By Wt. | By Vol. | |
| Anilin | 100.0 | 100.0 | 0.238 | Chloroform | 66.6 | 78.9 | 0.226 |
| " | 79.2 | 85.9 | 0.179 | " | 26.5 | 40.4 | 0.212 |
| " | 44.9 | 56.7 | 0.110 | " | 0.0 | 0.0 | 0.207 |
| " | 0.0 | 0.0 | 0.053 | β Naphthol | 86.0 | 93.9 | 0.190 |
| Carbon Bisulphide | 82.0 | 83.8 | 0.236 | " | 73.1 | 87.1 | 0.169 |
| " | 50.5 | 61.8 | 0.227 | Nitro Benzene | 78.4 | 88.5 | 0.207 |
| " | 26.0 | 35.7 | 0.187 | " | 46.8 | 69.5 | 0.157 |
| " | 14.5 | 21.2 | 0.144 | " | 0.0 | 0.0 | 0.090 |
| " | 0.0 | 0.0 | 0.096 | Phenanthrene | 87.2 | 95.4 | 0.205 |
| Naphthalene | 86.7 | 93.5 | 0.199 | " | 75.0 | 90.2 | 0.183 |
| " | 72.6 | 85.4 | 0.187 | | | | |

SOLUBILITY OF CARBON MONOXIDE IN MIXTURES OF BENZENE AND OTHER SOLVENTS AT 25°.

(Skirrow — Z. physik. Chem. 41, 144, '02.)

The solubility of the CO given in terms of the Ostwald Expression, see p. 105.

| Mixture of Benzene and: | % C ₆ H ₆ in Mixture. | | CO. lbs. | Mixture of Benzene and: | % C ₆ H ₆ in Mixture. | | CO. lbs. |
|-------------------------|---|---------|----------|-------------------------|---|---------|----------|
| | By Wt. | By Vol. | | | By Wt. | By Vol. | |
| Naphthalene | 100.0 | 100.0 | 0.174 | Anilin | 87.3 | 89.1 | 0.156 |
| " | 88.5 | 92.6 | 0.164 | " | 71.7 | 75.2 | 0.131 |
| " | 66.2 | 76.3 | 0.141 | " | 42.6 | 47.0 | 0.095 |
| Phenanthrene | 89.2 | 95.1 | 0.144 | " | 21.2 | 24.3 | 0.068 |
| " | 72.6 | 85.8 | 0.127 | " | 0.0 | 0.0 | 0.053 |
| α Naphthalene | 96.5 | 98.1 | 0.149 | Nitro Benzene | 71.8 | 80.1 | 0.152 |
| " | 87.9 | 93.1 | 0.139 | " | 45.1 | 56.4 | 0.127 |
| Ethyl Alcohol | 47.7 | 44.9 | 0.181 | " | 0.0 | 0.0 | 0.093 |
| " | 0.0 | 0.0 | 0.192 | | | | |

SOLUBILITY OF CARBON MONOXIDE IN MIXTURES OF TOLUENE AND OTHER SOLVENTS AT 25°.

(Skirrow.)

| Mixture of Toluene and: | % C ₆ H ₅ CH ₃ in Mixture. | | CO. lbs. | Mixture of Toluene and: | % C ₆ H ₅ CH ₃ in Mixture. | | CO. lbs. |
|-------------------------|---|---------|----------|-------------------------|---|---------|----------|
| | By Wt. | By Vol. | | | By Wt. | By Vol. | |
| Anilin | 100.0 | 100.0 | 0.182 | α Naphthol | 95.5 | 97.1 | 0.171 |
| " | 94.4 | 93.5 | 0.169 | " | 91.2 | 94.2 | 0.162 |
| " | 80.1 | 80.3 | 0.148 | Nitro Benzene | 81.7 | 85.7 | 0.160 |
| " | 55.4 | 55.6 | 0.115 | " | 50.8 | 58.1 | 0.131 |
| " | 25.4 | 25.6 | 0.077 | " | 23.7 | 29.3 | 0.108 |
| " | 0.0 | 0.0 | 0.053 | " | 0.0 | 0.0 | 0.093 |
| Naphthalene | 92.9 | 94.8 | 0.169 | Phenanthrene | 94.4 | 97.0 | 0.170 |
| " | 84.9 | 88.7 | 0.161 | " | 88.8 | 93.9 | 0.161 |
| " | 77.3 | 82.5 | 0.153 | " | 78.4 | 87.5 | 0.147 |

SOLUBILITY OF CARBON MONOXIDE IN MIXTURES OF ORGANIC SOLVENTS AT 25°.

(Skirrow.)

| Mixture Composed of: | | % of Latter in Mixture. | | CO. l ₂₈ . |
|---|---|-------------------------|---------|--------------------------|
| | | By Wt. | By Vol. | |
| Chloroform and Methyl Alcohol | | 0.0 | | 0.207 |
| " | " | 13.0 | | 0.202 |
| " | " | 100 | | 0.196 |
| Carbon Bisulphide and Ethyl Di Chloride | | | 100 | 0.147 |
| " | " | | 75 | 0.157 |
| " | " | | 51 | 0.160 |
| " | " | | 18.4 | 0.140 |
| " | " | | 0.0 | 0.083 |
| Methyl Alcohol and Glycerine | | 0.0 | 0.0 | 0.196 |
| " | " | 39.6 | 30.1 | 0.096 |
| " | " | 60.5 | 50.1 | 0.052 |
| " | " | 77.1 | 68.9 | 0.025 |
| " | " | 100.0 | 100.0 | very small |

NOTE. — From the results shown in the preceding five tables, it is concluded that the solubility of carbon monoxide in various mixtures of organic solvents is, in general, an additive function.

CARBON BISULPHIDE CS₂.

SOLUBILITY IN WATER.

(Chancel and Parmentier — Compt. rend. 100, 773, 85; Rex — Z. physik. Chem. 55, 355, '06.)

| t°. | Grams CS ₂ per 100 | | t°. | Grams CS ₂ per 100 | |
|-----|-------------------------------|---------------------------------|-----|-------------------------------|---------------------------------|
| | cc. Solu- tion. | Gms. H ₂ O (Rex). | | cc. Solu- tion. | Gms. H ₂ O (Rex). |
| 0 | 0.204 | 0.258 | 30 | 0.155 | 0.195 |
| 5 | 0.199 | ... | 35 | 0.137 | ... |
| 10 | 0.194 | 0.239 | 40 | 0.111 | ... |
| 15 | 0.187 | ... | 45 | 0.070 | ... |
| 20 | 0.179 | 0.101 | 49 | 0.014 | ... |
| 25 | 0.169 | ... | | | |

100 cc. H₂O dissolve 0.174 cc. CS₂ at 22°; Vol. of solution = 100.208,
Sp. Gr. = 0.9981.

100 cc. CS₂ dissolve 0.961 cc. H₂O at 22°; Vol. of solution = 100.961,
Sp. Gr. = 1.253. (Herz — Ber. 31, 2670, '98.)

SOLUBILITY OF CARBON BISULPHIDE IN:

Aq. Solutions of Ethyl Alcohol at 17°.

(Tuchschmidt and Folleuins — Ber. 4, 583, '71.)

Methyl Alcohol.

(Rothmund — Z. physik. Chem. 26, 475, '98.)

| Wt. per cent Alcohol. | Gms. CS ₂ per 100 cc. Solvent. | Wt. per cent Alcohol. | Gms. CS ₂ per 100 cc. Solvent. | t°. | Wt. per cent CS ₂ in: | |
|-----------------------------|---|-----------------------------|---|--------------------|----------------------------------|---------------------------|
| | | | | | CH ₃ OH Layer. | CS ₂ Layer. |
| 100 | ∞ | 91.37 | 50 | 10 | 45.1 | 98.3 |
| 98.5 | 182 | 84.12 | 30 | 20 | 50.8 | 97.2 |
| 98.15 | 132 | 76.02 | 20 | 25 | 54.2 | 96.4 |
| 96.95 | 100 | 48.40 | 2 | 30 | 58.4 | 95.5 |
| 93.54 | 70 | 47.90 | 0 | 35 | 64.0 | 93.5 |
| | | | | 40.5 (crit. temp.) | 80.5 | |

SOLUBILITY OF CARBON OXYSULPHIDE IN WATER.

(Winkler; see Landolt and Börnstein's Tabellen, 3d ed. p. 602, 1906.)

| t°. | β . | γ . | t°. | β . | γ . |
|-----|-----------|------------|-----|-----------|------------|
| 0 | 1.333 | 0.356 | 20 | 0.561 | 0.147 |
| 5 | 1.056 | 0.281 | 25 | 0.468 | 0.122 |
| 10 | 0.835 | 0.221 | 30 | 0.403 | 0.104 |
| 15 | 0.677 | 0.179 | | | |

For β and γ see Carbon Dioxide, page 105.CARVOXIME $C_{10}H_{14}NOH$.SOLUBILITY IN γ LIMONENE.

(Goldschmidt and Cooper — Z. physik. Chem. 26, 714, '98.)

| t°. | Gms. $C_{10}H_{14}NOH$ per 100 Gms. γ Limonene. | Solid Phase. | t°. | Gms. $C_{10}H_{14}NOH$ per 100 Gms. γ Limonene. | Solid Phase. |
|------|--|--------------------|------|--|--------------------|
| 24.6 | 44.6 | l Carvoxime | 48 | 198.7 | l Carvoxime |
| 30.0 | 59.2 | l Carvoxime | 49.4 | 199.7 | γ Carvoxime |
| 30.3 | 63.3 | γ Carvoxime | 55.4 | 325.1 | l Carvoxime |
| 38.4 | 104.3 | l Carvoxime | 55.9 | 346.6 | γ Carvoxime |
| 39.4 | 103.1 | γ Carvoxime | 58.8 | 560.0 | γ Carvoxime |
| 43.1 | 130.8 | l Carvoxime | 63.2 | 126.93 | γ Carvoxime |

CERIUM ACETATE, BUTYRATE, FORMATE, etc.

SOLUBILITY IN WATER.

(Wolff — Z. anorg. Chem. 45, 102, '05.)

| Salt. | Formula. | Grams Anhydrous Salt per 100 Gms. Solution at: | | |
|--------------|--|--|---------------|---------------|
| | | 11°. | 15°. | 76°. |
| Acetate | $Ce(C_2H_3O_2)_3 \cdot 1\frac{1}{2}H_2O$ | ... | 19.61 | 12.97 |
| Butyrate | $Ce(C_4H_7O_2)_3$, and $3H_2O$ | 3.544 | 3.406 | 1.984 |
| Iso Butyrate | $Ce(C_4H_7O_2)_3 \cdot 3H_2O$ | ... | 6.603 (20.4°) | 3.39 |
| Formate | $Ce(CHO_2)_3$ | ... | 0.398 (13°) | 0.374 (75.3°) |
| Propionate | $Ce(C_3H_5O_2)_3 \cdot H_2O$, and $3H_2O$ | ... | 18.99 | 15.93 |

CERIUM AMMONIUM NITRATE (Ceri) $Ce(NO_3)_4 \cdot 2NH_4NO_3$.

SOLUBILITY IN WATER.

(Wolff.)

| t°. | Gms. per 100 Gms. Solution. | | Atomic Relation. | Gms. $Ce(NO_3)_4 \cdot 2NH_4NO_3$ per 100 Gms. | |
|------|-----------------------------|---------------------------|-------------------------------|--|--------|
| | NH_4 . | Ce. | | Solution. | Water. |
| 25 | 4.065 | 15.16 | 2.08 : 1 | 58.49 | 140.9 |
| 35.2 | 4.273 | 16.10 | 2.06 : 1 | 61.79 | 161.7 |
| 45.3 | 4.489 | 16.69 | 2.08 : 1 | 64.51 | 174.9 |
| 64.5 | 4.625 | { 17.40 Ce 15.03 Ce IV | 2.06 : 1 Ce 2.39 : 1 Ce IV | 66.84 | 201.6 |
| 85.6 | 4.778 | { 18.16 Ce 15.79 Ce IV | 2.04 : 1 Ce 2.34 : 1 Ce IV | 69.40 | 226.8 |
| 112 | 6.117 | { 22.82 Ce 16.22 Ce IV | 2.08 : 1 Ce 2.95 : 1 Ce IV | 88.03 | 735.4 |

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CERIUM AMMONIUM NITRATE (Cero) $\text{Ce}(\text{NO}_3)_3 \cdot 2\text{NH}_4\text{NO}_3 \cdot 4\text{H}_2\text{O}$.

SOLUBILITY IN WATER.

(Wolff.)

| t°. | Gms. per 100 Gms. Solution. | | Atomic Relation. NH ₄ : Ce. | Gms. $\text{Ce}(\text{NO}_3)_3 \cdot 2\text{NH}_4\text{NO}_3$ per 100 Gms. | |
|-------|-----------------------------|-------|---|--|--------|
| | NH ₄ . | Ce. | | Solution. | Water. |
| 8.75 | 4.787 | 18.56 | 1.999 : 1 | 70.2 | 235.5 |
| 25.0 | 5.09 | 19.80 | 1.995 : 1 | 74.8 | 296.8 |
| 45.0 | 5.53 | 21.06 | 2.037 : 1 | 80.4 | 410.2 |
| 60.0 | 6.01 | 22.77 | 2.054 : 1 | 87.2 | 681.2 |
| 65.06 | 6.11 | 23.42 | 2.022 : 1 | 89.1 | 817.4 |

CERIUM AMMONIUM SULPHATE $\text{Ce}_2(\text{SO}_4)_3 \cdot (\text{NH}_4)_2\text{SO}_4 \cdot 8\text{H}_2\text{O}$.

SOLUBILITY IN WATER.

(Wolff.)

| t°. | Gms. $\text{Ce}_2(\text{SO}_4)_3 \cdot (\text{NH}_4)_2\text{SO}_4$ per 100 Gms. Solution. | | Solid Phase. | t°. | Gms. $\text{Ce}_2(\text{SO}_4)_3 \cdot (\text{NH}_4)_2\text{SO}_4$ per 100 Gms. Solution. | | Solid Phase. |
|------|---|--------|--------------------|-------|---|--------|--------------|
| | | Water. | | | | Water. | |
| 22.3 | 5.06 | 5.33 | .8H ₂ O | 45.0 | 2.91 | 2.99 | Anhydride |
| 35.1 | 4.93 | 5.18 | " | 55.25 | 2.16 | 2.21 | " |
| 45.2 | 4.76 | 4.99 | " | 75.4 | 1.46 | 1.48 | " |
| | | | | 85.2 | 1.17 | 1.18 | " |

CERIUM SULPHATE $\text{Ce}_2(\text{SO}_4)_3$.

SOLUBILITY OF THE SEVERAL HYDRATES IN WATER.

(Koppel — Z. anorg. Chem. 41, 377, '04; the previous determinations by Muthman and Rodig — Z. anorg. Chem. 16, 455, '08, and by Wyrouboff — Bull. soc. chim. [3] 25, 121, '01, are shown by Koppel to be inaccurate.)

| t°. | Gms. $\text{Ce}_2(\text{SO}_4)_3$ per 100 Gms. Solution. | | Mols. $\text{Ce}_2(\text{SO}_4)_3$ per 100 Mols. H ₂ O. | Solid Phase. | t°. | Gms. $\text{Ce}_2(\text{SO}_4)_3$ per 100 Gms. Solution. | | Mols. $\text{Ce}_2(\text{SO}_4)_3$ per 100 Mols. H ₂ O. | Solid Phase. |
|------|--|-------|--|--------------|-------|--|--------|--|--------------|
| | | | | | | | | | |
| 0 | 14.20 | 0.525 | $\text{Ce}_2(\text{SO}_4)_3 \cdot 12\text{H}_2\text{O}$ | | 20.5 | 8.69 | 0.302 | $\text{Ce}_2(\text{SO}_4)_3 \cdot 8\text{H}_2\text{O}$ | |
| 18.8 | 14.91 | 0.555 | " | | 40 | 5.613 | 0.188 | " | |
| 19.2 | 15.04 | 0.561 | " | | 60 | 3.88 | 0.129 | " | |
| 0 | 17.35 | 0.665 | $\text{Ce}_2(\text{SO}_4)_3 \cdot 10\text{H}_2\text{O}$ | | 45 | 8.116 | 0.280 | $\text{Ce}_2(\text{SO}_4)_3 \cdot 5\text{H}_2\text{O}$ | |
| 15 | 10.61 | 0.376 | " | | 60 | 3.145 | 0.103 | " | |
| 21 | 8.863 | 0.308 | " | | 80 | 1.19 | 0.0382 | " | |
| 31.6 | 6.686 | 0.227 | " | | 100.5 | 0.46 | 0.0149 | " | |
| 45.6 | 4.910 | 0.164 | " | | 35 | 7.8 | 0.27 | $\text{Ce}_2(\text{SO}_4)_3 \cdot 4\text{H}_2\text{O}$ | |
| 50 | 4.465 | 0.148 | " | | 40 | 5.71 | 0.19 | " | |
| 60 | 3.73 | 0.123 | " | | 50 | 3.31 | 0.11 | " | |
| 65 | 3.47 | 0.114 | " | | 65 | 1.85 | 0.06 | " | |
| 0 | 15.95 | 0.605 | $\text{Ce}_2(\text{SO}_4)_3 \cdot 8\text{H}_2\text{O}$ | | 82 | 0.98 | 0.032 | " | |
| 15 | 9.95 | 0.350 | " | | 100.5 | 0.42 | 0.014 | " | |

CHLORAL HYDRATE $C_2HCl_3O.H_2O$.SOLUBILITY IN WATER, ETHYL ALCOHOL, CHLOROFORM, AND IN
TOLUENE.

(Speyers — Am. Ch. J. [4] 14, 294, '02.)

Calculated from the original results, which are given in terms of
gram molecules of chloral hydrate per 100 gram mols. of solvent.

| t°. | In Water. | | In Alcohol. | | In Chloroform. | | In Toluene. | |
|-----|-----------|-------|-------------|-------|----------------|-------|-------------|-------|
| | W. | S. | W. | S. | W. | S. | W. | S. |
| 0 | 1.433 | 189.7 | 1.11 | 123.3 | 1.530 | 3.7 | 0.898 | 3.2 |
| 5 | 1.460 | 233.0 | 1.16 | 130.0 | 1.515 | 4.0 | 0.900 | 4.0 |
| 10 | 1.485 | 275.0 | 1.23 | 140.0 | 1.510 | 5.0 | 0.910 | 7.0 |
| 15 | 1.510 | 330.0 | 1.30 | 160.0 | 1.505 | 9.0 | 0.915 | 11.0 |
| 20 | 1.535 | 383.0 | 1.36 | 185.0 | 1.510 | 19.0 | 0.94 | 21.0 |
| 25 | 1.555 | 433.0 | 1.42 | 215.0 | 1.520 | 34.0 | 0.97 | 36.0 |
| 30 | 1.580 | 480.0 | 1.49 | 245.0 | 1.540 | 56.0 | 1.02 | 56.0 |
| 35 | 1.59 | 516.0 | 1.55 | 280.0 | 1.570 | 80.0 | 1.13 | 80.0 |
| 40 | 1.605 | ... | 1.60 | 320.0 | 1.590 | 110.0 | 1.40 | 110.0 |
| 45 | 1.620 | ... | ... | ... | ... | ... | ... | ... |

W = wt. of 1 cc. saturated solution, S = Gms. $C_2HCl_3.H_2O$ per 100
grams solvent.**CHLORINE** Cl.

SOLUBILITY IN WATER.

(Winkler — Landolt and Börnstein's Tabellen, 3d ed. p. 532, 601, '06; Roozeboom — Rec. trav. chim.
3, 59, '84; 4, 69, '85; Z. physik. Chem. 2, 452, '88.)

| t°. | β' . | q. | t°. | Gms. Cl per 100 Gms. H_2O . | Solid Phase. |
|------|------------|-------|-------|----------------------------------|-----------------|
| 0 | 4.610 | 1.46 | -0.24 | 0.492 | Ice + Cl.8 aq. |
| 3 | 3.947 | 1.25 | 0 | 0.507-0.560 | Cl.8 aq. |
| 6 | 3.411 | 1.08 | 2 | 0.644 | " |
| 9 | 3.031 | 0.96 | 4 | 0.732 | " |
| 9.6 | 2.980 | 0.94 | 6 | 0.823 | " |
| 12.0 | 2.778 | 0.88 | 8 | 0.917 | " |
| 10 | 3.095 | 0.997 | 9 | 0.965-0.908 | " |
| 15 | 2.635 | 0.849 | 20 | 1.85 | " |
| 20 | 2.260 | 0.729 | 28.7 | 3.69 | " |
| 25 | 1.985 | 0.641 | | | |
| 30 | 1.769 | 0.572 | | | |
| 40 | 1.414 | 0.459 | | | |
| 50 | 1.204 | 0.393 | | | |
| 60 | 1.006 | 0.329 | | | |
| 70 | 0.848 | 0.279 | | | |
| 80 | 0.672 | 0.223 | | | |
| 90 | 0.380 | 0.127 | | | |
| 100 | 0.000 | 0.000 | | | |

 β' = vol. of Cl (red. to 0° and 760 mm.) absorbed by 1 vol. H_2O at
total pressure of 760 mm.q = Gms. Cl per 100 gms. H_2O at a total pressure of 760 mm.

SOLUBILITY IN WATER.

(Goodwin — Ber. 15, 3039, '82.)

The saturated aqueous solution of the chlorine was cooled until chlorhydrate separated; the temperature was then gradually raised and portions withdrawn for analysis at intervals. Slightly different results were obtained for solutions in contact with much, little, or no chlorhydrate. The following results are taken from an average curve.

| t°. | Solubility Coefficient. | t°. | Solubility Coefficient. | t°. | Solubility Coefficient. |
|-----|-------------------------|------|-------------------------|-----|-------------------------|
| 2.5 | 1.76 | 11 | 3.0 | 25 | 2.06 |
| 5.0 | 2.00 | 12.5 | 2.75 | 30 | 1.8 |
| 7.5 | 2.25 | 15 | 2.6 | 40 | 1.35 |
| 10 | 2.7 | 20 | 2.3 | 50 | 1.0 |

SOLUBILITY OF CHLORINE IN AQUEOUS SOLUTIONS OF HYDROCHLORIC ACID AND OF POTASSIUM CHLORIDE.

(Goodwin.)

| t°. | Coefficient of Solubility in: | | | |
|-----|-------------------------------|------------------------|-------------------------|-----------------------------|
| | HCl (1.046 Sp. Gr.). | HCl (1.08 Sp. Gr.). | HCl (1.125 Sp. Gr.). | KCl (20 g. per 100 cc.). |
| 0 | 4.1 | 6.4 | 7.3 | 1.5 |
| 5 | 5.1 | 5.2 | 6.7 | 2.0 |
| 10 | 4.1 | 4.5 | 6.1 | 2.2 |
| 15 | 3.5 | 3.9 | 5.5 | 1.6 |
| 20 | 3.0 | 3.4 | 4.7 | 1.2 |
| 25 | 2.5 | 3.0 | 4.0 | 1.0 |
| 30 | 2.0 | 2.4 | ... | 0.9 |
| 40 | 1.25 | 1.6 | ... | ... |

Goodwin also gives results for solutions of NaCl, CaCl₂, MgCl₂, SrCl₂, Fe₂Cl₂, CoCl₂, NiCl₂, MnCl₂, CdCl₂, LiCl, and in mixtures of some of these, but the concentrations of the salt solutions are not stated.

SOLUBILITY OF CHLORINE IN AQUEOUS SOLUTIONS OF SODIUM CHLORIDE.

(Kumpf — Wied. Ann. Beibl. 6, 276, '82; Kohn and O'Brien — J. Soc. Chem. Ind. 17, 100, '98.)

| t°. | Coefficient of Solubility in: | | | |
|-----|-------------------------------|--------------|--------------|--------------|
| | 9.97% NaCl. | 16.01% NaCl. | 19.66% NaCl. | 26.39% NaCl. |
| 0 | 2.3 | 1.9 | 1.7 | 0.5 |
| 5 | 2.0 | 1.6 | 1.4 | 0.44 |
| 10 | 1.7 | 1.3 | 1.15 | 0.4 |
| 15 | 1.4 | 1.06 | 0.95 | 0.36 |
| 20 | 1.2 | 0.9 | 0.8 | 0.34 |
| 25 | 0.94 | 0.75 | 0.65 | 0.3 |
| 50 | ... | ... | ... | 0.2 |
| 80 | ... | ... | ... | 0.05 |

100 cc. of 6.2 per cent CaCl₂ solution dissolve 0.245 gram Cl at 12°.
 100 cc. of 6.2 per cent MgCl₂ solution dissolve 0.233 gram Cl at 12°.
 100 cc. of 6.2 per cent MnCl₂ solution dissolve 0.200 gram Cl at 12°.

For coefficient of solubility see page 105.

CHLORINE MONOXIDE Cl_2O .

100 volumes of water at 0° absorb 200 volumes of Cl_2O gas.

CHLORINE TRIOXIDE Cl_2O_3 .

SOLUBILITY IN WATER AT APPROX. 760 MM. PRESSURE.

(Brandan — Liebig's Ann. 151, 340, '69.)

| t° . | 8.5° . | 14.0° . | 21° . | 93° . |
|--|---------------|----------------|--------------|--------------|
| Gms. Cl_2O_3 per 100 gms. H_2O | 4.765 | 5.012 | 5.445 | 5.651 |

Garzarolli and Thurnbalk — Liebig's Ann. 209, 184, '81, say that Cl_2O_3 does not exist, and above figures are for mixtures of Cl_2O and Cl .

CHLOROFORM CHCl_3 .

SOLUBILITY IN WATER.

(Chancel and Parmentier — Compt. rend. 100, 473, 85; Rex — Z. physik. Chem. 55, 355, '06.)

| t° . | Gms. CHCl_3 per Liter of Solution. | Density of Solutions. | t° . | Gms. CHCl_3 per 100 Gms. H_2O (Rex). |
|-------------|---|-----------------------|-------------|---|
| 0 | 9.87 | 1.00378 | | |
| 3.2 | 8.90 | ... | 0 | 1.062 |
| 17.4 | 7.12 | 1.00284 | 10 | 0.895 |
| 29.4 | 7.05 | 1.00280 | 20 | 0.822 |
| 41.6 | 7.12 | 1.00284 | 30 | 0.776 |
| 54.9 | 7.75 | 1.00309 | | |

100 cc. H_2O dissolve 0.42 cc. CHCl_3 at 22° ; Vol. of sol. = 100.39 cc., Sp. Gr. = 1.0002.

100 cc. CHCl_3 dissolve 0.152 cc. H_2O at 22° ; Vol. of sol. = 99.62 cc., Sp. Gr. = 1.4831.

(Herz — Ber. 31, 2670, '98.)

SOLUBILITY OF CHLOROFORM IN AQUEOUS ETHYL ALCOHOL, METHYL ALCOHOL, AND ACETONE MIXTURES AT 20° .

(Bancroft — Phys. Rev. 3, 29, '95, '96.)

In Ethyl Alcohol.

| Per 5 cc. $\text{C}_2\text{H}_5\text{OH}$. | |
|---|-----------------------|
| cc. H_2O . | cc. CHCl_3 . |
| 10 | 0.20 |
| 8 | 0.3 |
| 6 | 0.515 |
| 4 | 1.13 |
| 2 | 2.51 |
| 1 | 4.60 |
| 0.91 | 5.0 |
| 0.76 | 6.0 |
| 0.55 | 8.0 |
| 0.425 | 10.0 |
| 0.20 | 20.0 |
| 0.125 | 30.24 |

In Methyl Alcohol.

| Per 5 cc. CH_3OH . | |
|------------------------------------|-----------------------|
| cc. H_2O . | cc. CHCl_3 . |
| 10 | 0.10 |
| 5 | 0.48 |
| 4 | 0.80 |
| 2 | 4.0 |
| 1.49 | 7.0 |
| 1.35 | 8.0 |
| 1.12 | 10.0 |

In Acetone.

| Per 5 cc. $(\text{CH}_3)_2\text{CO}$ | |
|--------------------------------------|-----------------------|
| cc. H_2O . | cc. CHCl_3 . |
| 5.0 | 0.16 |
| 4.0 | 0.22 |
| 3.0 | 0.33 |
| 2.0 | 0.58 |
| 1.0 | 0.955 |
| 0.79 | 1.12 |
| 0.505 | 1.60 |
| 0.30 | 2.50 |
| 0.21 | 3.50 |
| 0.19 | 4.0 |
| 0.16 | 5.0 |
| 0.12 | 10.0 |

CHROMIUM ALUMS

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SOLUBILITY OF CHROMIUM ALUMS IN WATER AT 25°.

(Locke — Am. Ch. J. 26, 174, '01.)

| Alum. | Formula. | Per 100 cc. Water. | | |
|-------------------------|---------------------------------|--------------------|-----------------|------------|
| | | Grams Anhydrous. | Grams Hydrated. | Gram Mols. |
| Potassium Chromium Alum | $K_2Cr_2(SO_4)_4 \cdot 24H_2O$ | 12.51 | 24.39 | 0.0441 |
| Tellurium Chromium Alum | $Te_2Cr_2(SO_4)_4 \cdot 24H_2O$ | 10.41 | 16.38 | 0.0212 |

CHROMIUM CHLORIDE (ic) $CrCl_3 \cdot 6\frac{1}{2}H_2O$.

100 grams H_2O dissolve 130 grams (green modification) at 15°.

(Recoura — Compt. rend. 102, 518, '86.)

CHROMIUM DOUBLE SALTS.

SOLUBILITY IN WATER.

(Jørgensen — J. pr. Chem. [2] 20, 105, '79; [2] 30, 1, '84; [2] 42, 208, '90; Struve — *Ibid.* [2] 61, 457, '99.)

| Name of Salt. | Formula. | t°. | Gms. per 100 Gms. H_2O . |
|--------------------------------------|--|------|----------------------------|
| Chloro Tetra Amine Chromium Chloride | $CrCl(NH_3)_4(OH_2)Cl_2$ | 15 | 6.3 |
| Chloro Purpureo Chromium Chloride | $CrCl(NH_3)_3Cl_2$ | 16 | 0.65 |
| Luteo Chromium Nitrate | $Cr(NH_3)_6(NO_3)_3$ | ? | 2.6 |
| Chloro Purpureo Chromium Nitrate | $CrCl(NH_3)_5(NO_3)_2$ | 17.5 | 1.4 |
| Chromic Potassium Molybdate | $3K_2O \cdot Cr_2O_3 \cdot 12MoO_3 \cdot 20H_2O$ | 17 | 2.5 |

CHROMIUM TRIOXIDE CrO_3 .

SOLUBILITY IN WATER.

(Mylus and Funk — Wiss. Abh. p. t. Reichenstalt, 3, 451, '00.)

| t°. | Gms. CrO_3 per 100 g. Solution. | Mols. CrO_3 per 100 Mols. H_2O . | Solid Phase. |
|-----|-----------------------------------|--------------------------------------|--------------|
| 0 | 62.08 | 29.4 | CrO_3 |
| 15 | 62.38 | 29.8 | " |
| 18 | 62.45 | 29.91 | " |
| 50 | 64.55 | 32.7 | " |
| 99 | 67.39 | 37.1 | " |

Density of solution saturated at 18° = 1.705.

CHROMIUM SULPHATES (ous and ic).

SOLUBILITY IN WATER.

| Salt. | Gms. per 100 Gms. H_2O . | Solid Phase. | Authority. |
|----------|----------------------------|-----------------------------|--|
| Chromous | 12.35 | $CrSO_4 \cdot 7H_2O$ | (Moissan — Bull. soc. chim. [2] 37, 296, '82.) |
| Chromic | 120.0 | $Cr_2(SO_4)_3 \cdot 18H_2O$ | (Etard — Compt. rend. 84, 1090, '77.) |

CHREYSAROBIN $C_{30}H_{26}O_7$.

SOLUBILITY IN SEVERAL SOLVENTS.

(U. S. P.)

| Solvent. | Gms. per 100 Gms. Solvent at: | | Solvent. | Gms. per 100 Gms. Solvent at 25°. |
|----------|-------------------------------|-------------|-------------------|-----------------------------------|
| | 25°. | 80°. | | |
| Water | 0.021 | 0.046 | Chloroform | 5.55 |
| Alcohol | 0.324 | 0.363 (60°) | Ether | 0.873 |
| Benzene | 4.0 | ... | Amyl Alcohol | 3.33 |
| | | | Carbon Disulphide | 0.43 |

OHRYSSEN $C_{18}H_{12}$.**SOLUBILITY IN TOLUENE AND IN ABS. ALCOHOL.**

(v. Becchi.)

100 gms. toluene dissolve 0.24 gm. $C_{18}H_{12}$ at 18° , and 5.39 gms. at 100° .

100 gms. abs. alcohol dissolve 0.097 gm. $C_{18}H_{12}$ at 16° , and 0.170 gm. at b. pt.

CINCHONA ALKALOIDS.**SOLUBILITY OF CINCHONIN, CINCHONIDIN, CHININ, AND CHINIDIN IN SEVERAL SOLVENTS AT 18° – 22° .**

(Müller — Apoth. Ztg. 18, 233, '03; see also Prunier — J. pharm. chim. [4] 29, 136, '79.)

Grams of the Alkaloid per 100 Grams Solution.

| Solvent. | Cinchonin $C_{19}H_{22}N_2O$. | Cinchonidin $C_{19}H_{22}N_2O$. | Chinin $C_{20}H_{24}N_2O_2$. | | Chinidin $C_{20}H_{24}N_2O_2$. |
|------------------------------|-----------------------------------|-------------------------------------|----------------------------------|------------|------------------------------------|
| | | | Hydrate. | Anhydride. | |
| Ether | 0.10 | 0.211 | 1.619 | 0.876 | 0.776 |
| Ether sat. with H_2O | 0.123 | 0.523 | 5.618 | 2.794 | 1.629 |
| H_2O sat. with Ether | 0.025 | 0.0306 | 0.0667 | 0.0847 | 0.031 |
| Benzene | 0.0545 | 0.099 | 0.2054 | 1.700 | 2.451 |
| Chloroform | 0.6979 | 9.301 | 100+ | 100+ | 100+ |
| Acetic Ether | 0.0719 | 0.3003 | 4.65 | 2.469 | 1.761 |
| Petroleum Ether | 0.0335 | 0.0475 | 0.0103 | 0.0211 | 0.0241 |
| Carbon Tetra Chloride | 0.0361 | 0.0508 | 0.203 | 0.529 | 0.565 |
| Water | 0.0239 | 0.0255 | 0.574 | 0.0506 | 0.0202 |
| Glycerine (15.5°) | 0.50 | ... | 0.50 | ... | ... |

100 grams chloroform dissolve 0.565 gm. cinchonin at 50° .

100 grams abs. ether dissolve 0.264 gm. cinchonidin at 32° .

(Köhler — Z. anal. Chem. 18, 242, '79.)

SOLUBILITY OF CINCHONIN AND CINCHOTIN SULPHATE, TARTRATE, BITARTRATE, OXALATE, AND HYDROCHLORIDE IN WATER.

(Forst and Böhringer — Ber. 14, 1266, '81.)

| Cinchonin Salts. | | | Cinchotin Salts. | | |
|--|------|----------------------------------|--|------|----------------------------------|
| Formula. | t.°. | Gms. per 100 Gms. H_2O . | Formula. | t.°. | Gms. per 100 Gms. H_2O . |
| $2(C_{19}H_{22}N_2O)SO_4H_2 \cdot 2H_2O$ | 13 | 1.52 | $2(C_{19}H_{22}N_2O)SO_4H_2 \cdot 2H_2O$ | 13 | 3.28 |
| $2(C_{19}H_{22}N_2O)C_4H_4O_6 \cdot 2H_2O$ | 16 | 3.0 | $2(C_{19}H_{22}N_2O)C_4H_4O_6 \cdot 2H_2O$ | 16 | 1.76 |
| $C_{19}H_{22}N_2O \cdot C_4H_4O_6 \cdot 4H_2O$ | 16 | 0.99 | $C_{19}H_{22}N_2O \cdot C_4H_4O_6 \cdot 4H_2O$ | 16 | 1.28 |
| $2(C_{19}H_{22}N_2O) \cdot C_2H_2O_4 \cdot H_2O$ | 20 | 0.96 | $2(C_{19}H_{22}N_2O) \cdot C_2H_2O_4 \cdot H_2O$ | 10 | 1.16 |
| $C_{19}H_{22}N_2O \cdot HCl \cdot 2H_2O$ | 10 | 4.16 | $C_{19}H_{22}N_2O \cdot HCl \cdot 2H_2O$ | 10 | 2.12 |

SOLUBILITY OF CINCHONINE SULPHATE AND OF CINCHONIDINE SULPHATE IN SEVERAL SOLVENTS.

(U. S. P.)

| Solvent. | Gms. ($C_{19}H_{22}N_2O_2$) $\cdot 2H_2SO_4 \cdot 2H_2O$ per 100 Gms. Solvent. | | Gms. $C_{19}H_{22}N_2O \cdot H_2SO_4 \cdot 3H_2O$ per 100 Gms. Solvent. | |
|------------|---|-----------------------|--|----------------------|
| | At 25° . | At 80° . | At 25° . | At 80° . |
| Water | 1.72 | 3.1 | 1.60 | 4.80 |
| Alcohol | 10.0 | 19.2 (60°) | 1.4 | 3.1 (60°) |
| Ether | 0.04 | ... | 0.02 | ... |
| Chloroform | 1.45 | ... | 0.11 | ... |
| Glycerine | 6.7 (15°) | ... | ... | ... |

CINNAMIC ACID $C_6H_5CH:CH.COOH$.

SOLUBILITY OF CINNAMIC ACID IN AQUEOUS SOLUTIONS OF SODIUM ACETATE, BUTYRATE, FORMATE, AND SALICYLATE AT 26.4° .
(Philip — J. Chem. Soc. 87, 992, '05.)

Calculated from the original results, which are given in terms of molecular quantities per liter.

| Gms. Na Salt per Liter. | Gms. $C_6H_5CH:CH.COOH$ per Liter in Solutions of: | | | |
|----------------------------|--|-----------------|------------|---------------------|
| | CH_3COONa . | C_2H_7COONa . | $HCOONa$. | $C_6H_4.OH.COONa$. |
| 0 | 0.56 | 0.56 | 0.56 | 0.56 |
| 1 | 1.50 | 1.30 | 0.92 | 0.62 |
| 2 | 2.12 | 1.85 | 1.12 | 0.70 |
| 3 | 2.52 | 2.25 | 1.27 | 0.73 |
| 4 | 2.85 | 2.60 | 1.40 | 0.77 |
| 5 | 3.05 | 2.90 | 1.47 | 0.80 |
| 8 | ... | ... | ... | 0.90 |

1 liter of aqueous solution contains 0.491 gm. $C_6H_5CH:CH.COOH$ at 25° (Paul).

SOLUBILITY OF CINNAMIC ACID IN AQUEOUS SOLUTIONS OF ANILIN AND OF PARA TOLUIDIN AT 25° .
(Lowenherz — Z. physik. Chem. 25, 394, '98.)

Original results in terms of molecular quantities per liter.

| In Aqueous Anilin. | | In Aqueous <i>p</i> Toluidin. | |
|--------------------|---------------------|-------------------------------|---------------------|
| Grams per Liter. | | Grams per Liter. | |
| $C_6H_5NH_2$. | $C_6H_5CH:CHCOOH$. | $C_6H_4CH_3NH_2$. | $C_6H_5CH:CHCOOH$. |
| 0 | 0.49 | 0 | 0.49 |
| 1 | 1.20 | 1 | 1.52 |
| 2 | 1.65 | 2 | 2.20 |
| 3 | 2.02 | 3 | 2.83 |
| 4 | 2.35 | 4 | 3.35 |
| 6 | 2.92 | 5 | 3.80 |

SOLUBILITY OF CINNAMIC ACID IN METHYL, ETHYL, AND PROPYL ALCOHOLS.

(Timofeiew — Compt. rend. 112, 1137, '91.)

| t° . | Grams $C_6H_5CH:CH.COOH$ per 100 Grams of: | | |
|-------------|--|--------------|--------------|
| | CH_3OH . | C_2H_5OH . | C_3H_7OH . |
| 0 | 20.65 | 15.61 | 10.63 |
| 19.5 | 28.91 | 22.03 | 15.41 |

SOLUBILITY OF BROM CINNAMIC ACIDS.

α Brom and β Brom Cinnamic Acid in Water at 25° .

(Paul — Z. physik. Chem. 14, 111, '94.)

α Brom Cinnamic Acid in Aq. Solutions of Oxalic Acid at 25° .

(Noyes — Z. physik. Chem. 6, 245, '90.)

| Acid. | Per 1000 cc. Solution. | | Normality of Solutions. | | Grams per Liter. | |
|--------------------------------|------------------------|------------|-------------------------|------------------------|------------------|------------------------|
| | Grams. | Millimols. | $(COOH)_2$. | $C_6H_5CH:CHBr:COOH$. | $(COOH)_2$. | $C_6H_5CH:CHBr:COOH$. |
| α , $C_6H_5CH:CHBrCOOH$ | 3.9325 | 17.32 | 0 | 0.0176 | 0.0 | 3.995 |
| β , $C_6H_5CHBr:CHCOOH$ | 0.5255 | 2.315 | 0.0275 | 0.0140 | 2.448 | 3.178 |
| | | | 0.0524 | 0.0129 | 4.716 | 2.928 |

CITRIC ACID $C_3H_4(OH)(COOH)_3.H_2O$.

SOLUBILITY IN SEVERAL SOLVENTS.
(U. S. P.; Bourgoin — Ann. chim. phys. [5] 13, 406, '78.)

| Solvent. | t°. | Gms. $C_3H_4(OH)(COOH)_3.H_2O$ per 100 Gms. | |
|------------------|--------|---|----------|
| | | Solution. | Solvent. |
| Water | 25 | 64.8 | 185 |
| Water | b. pt. | 70.3 | 250 |
| Alcohol (90%) | 25 | 34.6 | 75.9 |
| Alcohol (U.S.P.) | " | 39.2 | 64.5 |
| Alcohol (Abs.) | " | 43.2 | 52.8 |
| Ether | " | 2.21 | 2.26 |
| Ether (U.S.P.) | " | 5.2 | 5.55 |

COBALT BROMIDE $CoBr_2$.

SOLUBILITY IN WATER.
(Etard — Ann. chim. phys. [7] 2, 537, '94.)

| t°. | 50°. | 75°. | 97°. |
|-------------------------------------|------|------|-------------|
| Gms. $CoBr_2$ per 100 gms. solution | 66.7 | 66.8 | 68.1 (blue) |

COBALT DOUBLE SALTS.

SOLUBILITY IN WATER.
(Jørgensen — J. pr. Chem. [2] 18, 205, '78; 19, 49, '79; Kurnakoff — J. russ. phys. chem. Ges. 24, 629, '92.)

| Name. | Formula. | t°. | Gms. Salt per 100 Gms. H_2O . |
|--------------------------------------|--------------------------|------|---------------------------------|
| Chloro purpureo cobaltic bromide | $CoCl(NH_3)_5Br_2$ | 14.3 | 0.467 |
| Bromo purpureo cobaltic bromide | $CoBr(NH_3)_5Br_2$ | 16 | 0.19 |
| Chloro tetra amine cobaltic chloride | $CoCl(NH_3)_4(OH_2)Cl_2$ | | 2.50 |
| Chloro purpureo cobaltic chloride | $CoCl(NH_3)_5Cl_2$ | 0 | 0.232 |
| Chloro purpureo cobaltic chloride | $CoCl(NH_3)_5Cl_2$ | 15.5 | 0.41 |
| Chloro purpureo cobaltic chloride | $CoCl(NH_3)_5Cl_2$ | 46.6 | 1.03 |
| Luteo cobaltic chloride | $Co(NH_3)_5Cl_2$ | 0 | 4.26 |
| Luteo cobaltic chloride | $Co(NH_3)_5Cl_2$ | 46.6 | 12.74 |
| Roseo cobaltic chloride | $Co(NH_3)_5(OH_2)Cl_2$ | 0 | 16.12 |
| Roseo cobaltic chloride | $Co(NH_3)_5(OH_2)Cl_2$ | 16.2 | 24.87 |
| Chloro purpureo cobaltic iodide | $CoCl(NH_3)_5I_2$ | 19.2 | 2.0 |
| Chloro purpureo cobaltic nitrate | $CoCl(NH_3)_5(NO_3)_2$ | 15 | 1.25 |
| Chloro purpureo cobaltic sulphate | $CoCl(NH_3)_5SO_4.2H_2O$ | 17.3 | 0.75 |
| Nitrato purpureo cobaltic nitrate | $Co(NO_3)(NH_3)(NO_3)_2$ | 16 | 0.36 |

COBALT CHLORATE $Co(ClO_3)_2$.

SOLUBILITY IN WATER.
(Meusser — Ber. 35, 1419, '02.)

| t°. | Gms. $Co(ClO_3)_2$ per 100 Gms. Solution. | Mols. $Co(ClO_3)_2$ per 100 Mols. H_2O . | Solid Phase. | t°. | Gms. $Co(ClO_3)_2$ per 100 Gms. Solution. | Mols. $Co(ClO_3)_2$ per 100 Mols. H_2O . | Solid Phase. |
|------|---|--|-----------------------|-----|---|--|-----------------------|
| -12 | 29.97 | 3.41 | Ice | 18 | 64.19 | 14.28 | $Co(ClO_3)_2.4H_2O$. |
| -21 | 53.30 | 9.08 | $Co(ClO_3)_2.6H_2O$. | 21 | 64.39 | 14.51 | " |
| -19 | 53.61 | 9.20 | " | 35 | 67.09 | 16.10 | " |
| 0 | 57.45 | 10.75 | " | 47 | 69.66 | 18.29 | " |
| 10.5 | 61.83 | 12.90 | " | 61 | 76.12 | 25.39 | " |

Density of solution saturated at 18° = 1.861.

COBALT CHLORIDE CoCl_2 .

SOLUBILITY IN WATER.

(Etard — Compt. rend. 113, 699, '91; Ann. chim. phys. [7] 2, 537, '94.)

| t°. | Gms. CoCl_2 per 100 Gms. Solution. | Solid Phase. | t°. | Gms. CoCl_2 per 100 Gms. Solution. | Solid Phase. |
|-----|--|---|-----|--|---|
| -10 | 27.0 | $\text{CoCl}_2 \cdot 6\text{H}_2\text{O}$ (red) | 35 | 38.0 | $\text{CoCl}_2 \cdot \text{H}_2\text{O}$ (violet) |
| 0 | 29.5 | " | 40 | 41.0 | " |
| +10 | 31.5 | " | 50 | 47.0 | " |
| 20 | 33.5 | " | 60 | 47.5 | $\text{CoCl}_2 \cdot \text{H}_2\text{O}$ (blue) |
| 25 | 34.5 | " | 80 | 49.5 | " |
| 30 | 35.5 | " | 100 | 51.0 | " |

SOLUBILITY OF COBALT AMMONIUM CHLORIDES IN WATER.

(Kurnakoff — J. russ. phys. chem. Ges. 24, 629, '93; J. Chem. Soc. 64, ii, 509, '93.)

| Salt. | Grams per 100 Grams H_2O at: | | |
|---|--|--------|--------|
| | 0°. | 16.9°. | 46.6°. |
| $\text{CoCl}_2 \cdot 5\text{NH}_3$ | 0.232 | ... | 1.031 |
| $\text{CoCl}_2 \cdot 5\text{NH}_3 \cdot \text{H}_2\text{O}$ | 16.12 | 24.87 | ... |
| $\text{CoCl}_2 \cdot 6\text{NH}_3$ | 4.26 | ... | 12.74 |

SOLUBILITY OF COBALT CHLORIDE IN AQUEOUS HYDROCHLORIC
ACID SOLUTIONS AT 0°.

(Engel — Ann. chim. phys. [6] 7, 355, '89.)

| Milligram Mols. per 10 cc. Sol. | | Sp. Gr. of Solutions. | Gms. per 100 Gms. Solution. | | Gms. per 100 cc. Solution. | |
|------------------------------------|-------|--------------------------|--------------------------------|-------|-------------------------------|-------|
| $\frac{1}{2}\text{CoCl}_2$. | HCl. | | CoCl_2 . | HCl. | CoCl_2 . | HCl. |
| 62.4 | 0 | 1.343 | 30.17 | 0.00 | 40.5 | 0 |
| 58.52 | 3.7 | 1.328 | 28.62 | 0.102 | 38.0 | 0.135 |
| 50.8 | 11.45 | 1.299 | 25.39 | 0.321 | 33.0 | 0.417 |
| 37.25 | 25.2 | 1.248 | 19.43 | 0.738 | 24.2 | 0.919 |
| 12.85 | 55.0 | 1.167 | 7.15 | 1.718 | 8.34 | 2.00 |
| 4.75 | 74.75 | 1.150 | 2.68 | 2.369 | 3.08 | 2.72 |
| 12.0 | 104.5 | 1.229 | 6.34 | 3.099 | 7.79 | 3.81 |
| 25.0 | 139.0 | 1.323 | 12.27 | 3.829 | 16.24 | 5.07 |

SOLUBILITY OF COBALT CHLORIDE IN AQUEOUS ALCOHOL

AT 11.5°.

(Böttker — Z. physik. Chem. 22, 509, '97.)

10 gms. of $\text{CoCl}_2 \cdot 6\text{H}_2\text{O}$ were added to 20 cc. of alcohol and in addition the amounts of CoCl_2 shown in the second column. The solutions were shaken 2 hours, 5 cc. withdrawn, and the amount of dissolved CoCl_2 determined by evaporation and weighing.

| Vol. % Alcohol. | Gms. CoCl_2 Added. | Gms. per 5 cc. Solution. | | Vol. % Alcohol. | Gms. CoCl_2 Added. | Gms. per 5 cc. Sol. | |
|--------------------|--------------------------------|--------------------------|-------------------|--------------------|--------------------------------|------------------------|-------------------|
| | | H_2O . | CoCl_2 . | | | H_2O . | CoCl_2 . |
| 91.3 | 0.0 | 1.325 | 1.168 | 99.3 | 0.612 | 0.764 | 1.459 |
| 98.3 | 0.0 | 1.134 | 1.214 | 99.3 | 0.813 | 0.688 | 1.568 |
| 98.3 | 0.0 | 1.068 | 1.181 | 99.3 | 1.022 | 0.634 | 1.713 |
| 99.3 | 0.0 | 1.045 | 1.199 | 99.3 | 1.240 | 0.553 | 1.831 |
| 99.3 | 0.194 | 0.899 | 1.204 | 99.3 | 1.446 | 0.483 | 1.943 |
| 99.3 | 0.400 | 0.829 | 1.325 | 99.3 | 1.650 | 0.500 | 2.183 |

100 gms. sat. solution in alcohol (0.792 Sp. Gr.) contain 23.66 gms. CoCl_2 , Sp. Gr. = 1.0107.

(Winkler — J. pr. Chem. 91, 207, '64.)

SOLUBILITY OF COBALT CHLORIDE IN ORGANIC SOLVENTS.

| Solvent. | t°. | Gms. per 100 Gms. Solvent. | | Authority. |
|---------------|------|----------------------------|---------------------------------------|---|
| | | CoCl ₂ . | CoCl ₂ ·2H ₂ O. | |
| Acetone | 0 | 9.11 | 17.16 | (St. von Laszczynski — Ber. 27, 2285, '94.) |
| " | 22.5 | 9.28 | 17.06 | (St. von Laszczynski — Ber. 27, 2285, '94.) |
| " | 25 | 8.62 | ... | (Krug and McElroy — J. Anal. Ch. 6, 184, '92.) |
| " | 18 | 2.75 | ... | (Naumann — Ber. 37, 4332, '04.) |
| Ethyl Acetate | 14 | 0.08 | ... | (St. von Laszczynski.) |
| " | 79 | 0.26 | ... | " |
| Ether | ... | 0.021 | 0.0291 | (Böttker — Z. physik. Chem. 22, 509, '97.) |
| Glycol | ... | 10.7 | (per 100 g sol.) | (de Coninck — Bull. acad. roy. Belgique, 359, '05.) |

COBALT IODATE Co(IO₃)₂.

SOLUBILITY IN WATER.

(Meusser — Ber. 34, 2435, '01.)

| t°. | Solid Phase : | | Co(IO ₃) ₂ ·2H ₂ O. | | Co(IO ₃) ₂ . | |
|-----|---------------|-------|---|-------|-------------------------------------|-------|
| | G. | M. | G. | M. | G. | M. |
| 0 | 0.54 | 0.028 | 0.32 | 0.014 | ... | ... |
| 18 | 0.83 | 0.038 | 0.45 | 0.020 | 1.03 | 0.046 |
| 30 | 1.03 | 0.046 | 0.52 | 0.023 | 0.89 | 0.040 |
| 50 | 1.46 | 0.065 | 0.67 | 0.030 | 0.85 | 0.030 |
| 60 | 1.86 | 0.084 | ... | ... | ... | ... |
| 65 | 2.17 | 0.098 | ... | ... | ... | ... |
| 75 | ... | ... | 0.84 | 0.038 | 0.75 | 0.033 |
| 100 | ... | ... | 1.02 | 0.045 | 0.69 | 0.031 |

G = Gms. Co(IO₃)₂ per 100 gms. solution. M = Mols. Co(IO₃)₂, per 100 Mols. H₂O.

COBALT IODIDE CoI₂.

SOLUBILITY IN WATER.

(Etard — Compt. rend. 113, 699, '91; Ann. chim. phys. [7] 2, 537, '94.)

The accuracy of these results is doubtful.

| t°. | Gms. CoI ₂ per 100 Gms. Solution. | Solid Phase. | t°. | Gms. CoI ₂ per 100 Gms. Solution. | Solid Phase. |
|-----|--|--|-----|--|---|
| -10 | 55.5 | CoI ₂ ·H ₂ O (green) | 25 | 67.5 | CoI ₂ ·H ₂ O (olive) |
| 0 | 58.0 | " | 30 | 70.0 | " |
| 10 | 61.5 | " | 40 | 75.0 | CoI ₂ ·H ₂ O (yellow) |
| 15 | 63.2 | " | 50 | 79.0 | " |
| 20 | 65.2 | " | 80 | 80.0 | " |
| 25 | 67 | " | 110 | 81.0 | " |

COBALT NITRATE Co(NO₃)₂.

SOLUBILITY IN WATER.

(Funk — Wiss. Abh. p. t. Reichanstalt 3, 439, '00.)

| t°. | Gms. Co(NO ₃) ₂ per 100 Gms. Solution. | | Solid Phase. | t°. | Gms. Co(NO ₃) ₂ per 100 Gms. Solution. | | Solid Phase. |
|-------|---|---|--|-----|---|---|--|
| | Gms. | Mols. Co(NO ₃) ₂ per 100 Mols. H ₂ O. | | | Gms. | Mols. Co(NO ₃) ₂ per 100 Mols. H ₂ O. | |
| -26 | 39.45 | 6.40 | Co(NO ₃) ₂ ·9H ₂ O | 41 | 55.96 | 12.5 | Co(NO ₃) ₂ ·6H ₂ O |
| -20.5 | 42.77 | 7.35 | " | 56 | 62.88 | 16.7 | " |
| -21 | 41.55 | 6.98 | Co(NO ₃) ₂ ·6H ₂ O | 55 | 61.74 | 15.8 | Co(NO ₃) ₂ ·3H ₂ O |
| -10 | 43.69 | 7.64 | " | 62 | 62.88 | 16.7 | " |
| -4 | 44.85 | 7.99 | " | 70 | 64.89 | 18.2 | " |
| 0 | 45.66 | 8.26 | " | 84 | 68.84 | 21.7 | " |
| +18 | 49.73 | 9.71 | " | 91 | 77.21 | 33.3 | " |

Density of solution saturated at 18° = 1.575.

SOLUBILITY OF COBALT NITRATE IN GLYCOL.

(de Coninck — Bull. acad. roy. Belgique, 359, '05.)

100 grams saturated solution contain 80 gms. Cobalt Nitrate.

COBALT RUBIDIUM NITRITE $\text{Rb}_2\text{Co}(\text{NO}_2)_6 \cdot \text{H}_2\text{O}$.100 grams H_2O dissolve 0.005 gram of the salt.

(Rosenblatt — Ber. 19, 2531, '86.)

COBALT SULPHATE $\text{CoSO}_4 \cdot 7\text{H}_2\text{O}$.

SOLUBILITY IN WATER.

(Mulder; Tobler — Liebig's Ann. 95, 193, '55; Koppel — Wetzel — Z. physik. Chem. 52, 395, '05.)

| t°. | Gms. CoSO_4 per 100 Gms. | | Mols. CoSO_4 per 100 Mols. H_2O . | t°. | Gms. CoSO_4 per 100 Gms. | | Mols. CoSO_4 per 100 Mols. H_2O . |
|-----|--------------------------------------|--------|--|-----|--------------------------------------|--------|--|
| | Solution. | Water. | | | Solution. | Water. | |
| 0 | 20.35 | 25.55 | 2.958 | 35 | 31.40 | 45.80 | 5.31 |
| 5 | 21.90 | 28.03 | 3.251 | 40 | 32.81 | 48.85 | 5.664 |
| 10 | 23.40 | 30.55 | 3.540 | 50 | 35.56 | 55.2 | ... |
| 15 | 24.83 | 33.05 | 3.831 | 60 | 37.65 | 60.4 | ... |
| 20 | 26.58 | 36.21 | 4.199 | 70 | 39.66 | 65.7 | ... |
| 25 | 28.24 | 39.37 | 4.560 | 80 | 41.18 | 70.0 | ... |
| 30 | 29.70 | 42.26 | 4.903 | 100 | 45.35 | 83.0 | ... |

SOLUBILITY OF MIXTURES OF $\text{CoSO}_4 \cdot 7\text{H}_2\text{O}$ AND $\text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O}$
IN WATER.

(Koppel; Wetzel.)

| t°. | Gms. per 100 Gms. Solution. | | Gms. per 100 Gms. H_2O . | | Mols. per 100 Mols. H_2O . | | Solid Phase. |
|------|--------------------------------|----------------------------|---|----------------------------|---|----------------------------|--|
| | CoSO_4 . | Na_2SO_4 . | CoSO_4 . | Na_2SO_4 . | CoSO_4 . | Na_2SO_4 . | |
| 0 | 16.56 | 7.63 | 21.85 | 10.07 | 2.54 | 1.27 | $\text{CoSO}_4 \cdot 7\text{H}_2\text{O}$ + $\text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O}$ |
| 5 | 17.46 | 9.59 | 23.94 | 13.15 | 2.77 | 1.67 | " |
| 10 | 17.90 | 11.73 | 25.41 | 16.67 | 2.94 | 2.11 | " |
| 20 | 17.59 | 16.43 | 26.65 | 24.91 | 3.09 | 3.15 | $\text{CoNa}_2(\text{SO}_4)_2 \cdot 4\text{H}_2\text{O}$ |
| 25 | 17.06 | 15.70 | 25.36 | 23.32 | 2.95 | 2.97 | " |
| 30 | 15.94 | 14.93 | 23.15 | 21.61 | 2.70 | 2.74 | " |
| 35 | 15.73 | 14.52 | 22.54 | 20.85 | 2.62 | 2.64 | " |
| 40 | 14.87 | 14.22 | 20.98 | 20.05 | 2.46 | 2.53 | " |
| 18.5 | 18.75 | 15.61 | 28.61 | 23.82 | 3.32 | 3.02 | $\text{CoNa}_2(\text{SO}_4)_2 \cdot 4\text{H}_2\text{O}$ |
| 20 | 19.30 | 15.10 | 29.42 | 23.01 | 3.41 | 2.92 | + $\text{CoSO}_4 \cdot 7\text{H}_2\text{O}$ |
| 25 | 20.30 | 13.60 | 30.74 | 20.58 | 3.56 | 2.61 | " |
| 30 | 21.67 | 12.05 | 32.70 | 18.17 | 3.79 | 2.30 | " |
| 35 | 22.76 | 10.43 | 34.06 | 15.61 | 3.95 | 1.98 | " |
| 40 | 24.05 | 9.16 | 35.01 | 13.72 | 4.81 | 1.74 | " |
| 18.5 | 16.87 | 16.97 | 25.50 | 25.65 | 2.96 | 3.25 | $\text{CoNa}_2(\text{SO}_4)_2 \cdot 4\text{H}_2\text{O}$ |
| 20 | 15.41 | 18.12 | 23.18 | 27.26 | 2.69 | 3.45 | + $\text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O}$ |
| 25 | 10.63 | 23.26 | 16.07 | 35.17 | 1.86 | 4.46 | " |
| 30 | 6.01 | 28.67 | 9.20 | 43.74 | 1.07 | 5.54 | " |
| 35 | 4.56 | 32.14 | 7.19 | 50.79 | 0.835 | 6.44 | $\text{CoNa}_2(\text{SO}_4)_2 \cdot 4\text{H}_2\text{O}$ |
| 40 | 4.72 | 31.78 | 7.45 | 50.10 | 0.864 | 6.34 | + Na_2SO_4 |

SOLUBILITY OF COBALT SULPHATE IN METHYL AND ETHYL ALCOHOL
AND IN GLYCOL.

| Solvent. | t°. | Gms. per 100 Gms. Solvent. | | Observer. |
|-----------------------|----------------------------|----------------------------|---------------------------------------|---|
| | | CoSO ₄ . | CoSO ₄ .7H ₂ O. | |
| Methyl Alcohol (abs.) | 3 | ... | 42.8 | (de Bruyn—Z. physik. Ch. 10, 784, '92.) |
| " | 15 | ... | 50.9 | " |
| " | 18 | 1.04 | 54.5 | " |
| " (93.5%) | 3 | ... | 13.3 | " |
| " (50%) | 3 | ... | 1.8 | " |
| Ethyl Alcohol (abs.) | 3 | ... | 2.5 | " |
| Glycol | .. (per 100 gms. solution) | | 3.1 | (de Coninck—Bull. acad. roy. Belgique, 359, '05.) |

COCAINE C₁₇H₂₁NO₄.

COCAINE HYDROCHLORIDE C₁₇H₂₁NO₄.HCl.

SOLUBILITY IN SEVERAL SOLVENTS.

(U. S. P.; at 18°-22°; Müller—Apoth.-Ztg. 18, 248, '03.)

| Solvent. | t°. | Gms. per 100 Gms. Solvent. | | Solvent. | t°. | Gms. C ₁₇ H ₂₁ NO ₄ . per 100 Gms. Solvent. |
|----------------|-------|---|---|------------------------|-------|--|
| | | C ₁₇ H ₂₁ NO ₄ . | C ₁₇ H ₂₁ NO ₄ .HCl. | | | |
| Water | 25 | 0.17 | 250 | Ether+H ₂ O | 18-22 | 34.0 |
| Water | 80 | 0.38 | 1000 | H ₂ O+Ether | 18-22 | 0.254 |
| Alcohol | 25 | 20.0 | 38 | Benzene | 18-22 | 100 |
| Ether (U.S.P.) | 25 | 26.3 | ... | CCl ₄ | 17 | 18.5 |
| Ether | 18-22 | 11.6 | ... | Acetic Ether | 18-22 | 58.99 |
| Chloroform | 18-22 | 100+ | ... | Petroleum Ether | 18-22 | 2.37 |

CODEINE C₁₈H₂₁NO₃.H₂O, also the Phosphate and Sulphate.

COLOHIOINE C₂₂H₂₅NO₆.

SOLUBILITY IN SEVERAL SOLVENTS.

(U. S. P.; at 18°-22°, Müller.)

| Solvent. | t°. | Grams. per 100 Grams Solvent. | | | |
|----------------------------------|-------|--|---|---|---|
| | | C ₁₈ H ₂₁ NO ₃ .H ₂ O. | Codeine H ₃ PO ₄ .2 Aq. | Codeine H ₂ SO ₄ .5 Aq. | C ₂₂ H ₂₅ NO ₆ . |
| Water | 18-22 | ... | ... | ... | 9.616 |
| Water | 25 | 1.13 | 44.9 | 3.3 | 4.5 |
| Water | 80 | 1.70 | 217.0 | 16.0 | 5.0 |
| Alcohol | 25 | 62.5 | 0.383 | 0.096 | ... |
| Alcohol | 60 | 108.7 | 1.03 | 0.27 | ... |
| Ether | 25 | 8.0 | 0.075 | ... | 0.64 |
| Ether | 18-22 | ... | ... | ... | 0.126 |
| Ether sat. with H ₂ O | 18-22 | ... | ... | ... | 0.18 |
| H ₂ O sat. with Ether | 18-22 | ... | ... | ... | 12.05 |
| Benzene | 18-22 | ... | ... | ... | 0.939 |
| Benzene | 25 | ... | ... | ... | 1.15 |
| Chloroform | 25 | 151.5 | 0.015 | ... | 100+ |
| Carbon Tetra Chloride | 17 | 1.328 | ... | ... | 0.121 |
| Acetic Ether | 18-22 | ... | ... | ... | 1.342 |
| Petroleum Ether | 18-22 | ... | ... | ... | 0.058 |

COLLIDIN (2, 4, 6, Tri Methyl Pyridin) $C_6H_2N(CH_3)_3$.SOLUBILITY IN WATER.
(Rothmund — Z. physik. Chem. 26, 433, '98.)

| t°. | Gms. Collidin per 100 Gms. | | t°. | Gms. Collidin per 100 Gms. | |
|----------------|----------------------------|-----------------|-----|----------------------------|-----------------|
| | Aq. Layer. | Collidin Layer. | | Aq. Layer. | Collidin Layer. |
| 5.7 (crit. t.) | 17.20 | | | | |
| 10 | 7.82 | 41.66 | 80 | 1.73 | 86.12 |
| 20 | 3.42 | 54.92 | 100 | 1.78 | 88.07 |
| 30 | 2.51 | 62.80 | 120 | 1.82 | 88.98 |
| 40 | 1.93 | 70.03 | 140 | 2.19 | 89.10 |
| 60 | 1.76 | 80.19 | 160 | 2.93 | 87.2 |
| | | | 180 | 3.67 | ... |

COPPER ACETATE $Cu(C_2H_3O_2)_2 \cdot H_2O$.

100 grams of glycerine dissolve 10 grams of copper acetate at 15.5°.

COPPER BROMIDE (ous) Cu_2Br_2 .

SOLUBILITY OF CUPROUS BROMIDE IN AQUEOUS SOLUTIONS OF POTASSIUM BROMIDE AT 18°–20°.

(Bodländer and Storbeck — Z. anorg. Chem. 31, 460, '02.)

| Millimols per Liter. | | | | | Grams. per Liter. | | | |
|----------------------|-----------|-----------|----------|-----------|-------------------|-----------|----------|-----------|
| KBr. | Total Cu. | Total Br. | Cu (ic). | Cu (ous). | KBr. | Total Cu. | Cu (ic). | Cu (ous). |
| 0 | 0.3157 | 0.4320 | 0.2096 | 0.1061 | 0 | 0.0201 | 0.0133 | 0.0067 |
| 25 | 0.119 | ... | 0.012 | 0.107 | 2.98 | 0.0076 | 0.0007 | 0.0068 |
| 40 | 0.200 | ... | 0.013 | 0.187 | 4.76 | 0.0127 | 0.0007 | 0.0119 |
| 60 | 0.310 | ... | 0.025 | 0.285 | 7.15 | 0.0197 | 0.0015 | 0.0181 |
| 80 | 0.423 | ... | 0.012 | 0.411 | 9.53 | 0.0266 | 0.0007 | 0.0261 |
| 100 | 0.584 | ... | ... | 0.584 | 11.91 | 0.0371 | ... | 0.0371 |
| 120 | 0.693 | ... | ... | 0.693 | 14.29 | 0.0441 | ... | 0.0441 |
| 500 | 8.719 | ... | ... | 8.719 | 59.55 | 0.5540 | ... | 0.5540 |

COPPER CHLORATE (ic) $Cu(ClO_3)_2 \cdot 4H_2O$.

SOLUBILITY IN WATER.

(Meusser — Ber. 35, 1420, '02.)

| t°. | Gms. $Cu(ClO_3)_2$ per 100 Gms. Solution. | Mols. $Cu(ClO_3)_2$ per 100 Mols. H_2O . | Solid Phase. | t°. | Gms. $Cu(ClO_3)_2$ per 100 Gms. Solution. | Mols. $Cu(ClO_3)_2$ per 100 Mols. H_2O . | Solid Phase. |
|------|---|--|---------------------------|------|---|--|---------------------------|
| | | | | | | | |
| -12 | 30.53 | 3.43 | Ice | 18 | 62.17 | 12.84 | $Cu(ClO_3)_2 \cdot 4H_2O$ |
| -31 | 54.59 | 9.39 | $Cu(ClO_3)_2 \cdot 4H_2O$ | 45 | 66.17 | 15.28 | " |
| -21 | 57.12 | 10.41 | " | 59.6 | 69.42 | 17.73 | " |
| +0.8 | 58.51 | 11.02 | " | 71 | 76.9 | 25.57 | " |

Density of solution saturated at 18° = 1.695.

COPPER CHLORIDE (ic) $CuCl_2$.

SOLUBILITY IN WATER.

(Reicher and Deventer — Z. physik. Chem. 5, 560, '90; see also Etard — Ann. chim. phys. [7] 2, 528, '94.)

| t°. | Gms. $CuCl_2$ per 100 Gms. Solution. | t°. | Gms. $CuCl_2$ per 100 Gms. Solution. | t°. | Gms. $CuCl_2$ per 100 Gms. Solution. |
|-----|--------------------------------------|-----|--------------------------------------|-----|--------------------------------------|
| | | | | | |
| 0 | 41.4 | 25 | 44.0 | 50 | 46.65 |
| 10 | 42.45 | 30 | 44.55 | 60 | 47.7 |
| 20 | 43.5 | 40 | 45.6 | 80 | 49.8 |
| | | | | 100 | 51.9 |

Density of solution saturated at 0° = 1.511, at 17.5° = 1.579.

SOLUBILITY OF CUPRIC CHLORIDE IN AQUEOUS SOLUTIONS OF HYDROCHLORIC ACID AT 0°.

(Engel — Ann. chim. phys. [6] 17, 351, '89.)

| Milligram Mols. per 10 cc. Sol. | | Sp. Gr. of Solutions. | Gms. per 100 cc. Sol. | | Gms. per 100 Gms. Sol. | |
|-----------------------------------|-------|-----------------------|-----------------------|----------|------------------------|-------|
| $\frac{1}{2}$ CuCl ₂ . | HCl. | | CuCl ₂ . | HCl. | CuCl ₂ . | HCl. |
| 91.75 | 0 | 1.49 | 61.70 | 0.0 | 41.41 | 0.0 |
| 86.8 | 4.5 | 1.475 | 58.37 | 1.64 | 39.58 | 1.11 |
| 83.2 | 7.8 | 1.458 | 55.95 | 2.84 | 38.37 | 1.95 |
| 79.35 | 10.5 | 1.435 | 53.37 | 3.83 | 37.19 | 2.67 |
| 68.4 | 20.25 | 1.389 | 46.01 | 7.38 | 33.11 | 5.31 |
| 50.0 | 37.5 | 1.319 | 33.62 | 13.67 | 25.50 | 10.37 |
| 22.8 | 70.25 | 1.231 | 15.33 | 25.61 | 12.46 | 20.80 |
| 23.5 | 102.5 | 1.288 | 15.81 | 37.36 | 12.27 | 29.00 |
| 26.7 | 128.0 | 1.323 | 17.96 | 46.66 | 13.57 | 35.26 |
| | | | 29.0 | Sat. HCl | | |

SOLUBILITY OF CUPROUS CHLORIDE IN AQUEOUS SOLUTIONS OF HYDROCHLORIC ACID.

(Engel — *Ibid.* [6] 17, 372, '89; Compt. rend. 121, 529, '95.)

| Milligram Mols. per 10 cc. Sol. | | Sp. Gr. of Solutions. | Gms. per 100 cc. Sol. | | Gms. per 100 Gms. Sol. | |
|---------------------------------------|-------|-----------------------|----------------------------|-------|----------------------------|-------|
| $\frac{1}{2}\text{Cu}_2\text{Cl}_2$. | HCl. | | Cu_2Cl_2 . | HCl. | Cu_2Cl_2 . | HCl. |
| Results at 0°. | | | | | | |
| 0.475 | 8.975 | 1.05 | 0.471 | 0.327 | 0.448 | 0.312 |
| 1.5 | 17.5 | 1.049 | 1.486 | 0.638 | 1.418 | 0.608 |
| 2.9 | 26.0 | 1.065 | 2.872 | 0.948 | 2.697 | 0.932 |
| 4.5 | 34.5 | 1.080 | 4.457 | 1.257 | 4.127 | 1.164 |
| 8.25 | 47.8 | 1.135 | 8.172 | 1.743 | 7.199 | 1.535 |
| 15.5 | 68.5 | 1.261 | 15.7 | 2.497 | 12.46 | 1.980 |
| 33.0 | 104.0 | 1.345 | 32.68 | 3.827 | 24.30 | 2.845 |
| Results at 15°-16°. | | | | | | |
| 7.4 | 54.4 | 1.19 | 7.33 | 1.983 | 6.159 | 1.666 |
| 10.8 | 68.9 | 1.27 | 10.69 | 2.511 | 8.422 | 1.977 |
| 12.8 | 75.0 | 1.29 | 12.68 | 2.734 | 9.826 | 2.119 |
| 16.0 | 92.0 | 1.38 | 15.84 | 3.346 | 11.48 | 2.424 |

COPPER CHLORIDE, AMMONIUM CHLORIDE MIXTURES IN AQUEOUS SOLUTION AT 30°.

(Meerburg — Z. anorg. Chem. 45, 3, '05.)

| Grams per 100 Gms. Sat. Solution. | | Grams per 100 Gms. Solid Phase. | | Solid Phase. |
|-----------------------------------|---------------------|---------------------------------|---------------------|---|
| CuCl ₂ . | NH ₄ Cl. | CuCl ₂ . | NH ₄ Cl. | |
| 0 | 29.5 | ... | ... | NH ₄ Cl |
| 1.9 | 28.6 | 6.0 | 48.2 | NH ₄ Cl + CuCl ₂ ·2NH ₄ Cl·2H ₂ O |
| 3.6 | 25.9 | 37.0 | 34.9 | CuCl ₂ ·2NH ₄ Cl·2H ₂ O |
| 10.5 | 16.5 | 21.7 | 23.1 | " |
| 19.9 | 9.4 | 28.5 | 18.4 | " |
| 29.4 | 4.9 | 35.1 | 15.3 | " |
| 41.4 | 2.1 | 43.1 | 13.3 | " |
| 43.2 | 2.0 | 51.9 | 6.6 | CuCl ₂ ·2NH ₄ Cl·2H ₂ O + CuCl ₂ ·2H ₂ O |
| 43.9 | 0 | ... | ... | CuCl ₂ ·2H ₂ O |

**COPPER AMMONIUM
CHLORIDE**

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COPPER AMMONIUM CHLORIDE $\text{CuCl}_2 \cdot 2\text{NH}_4\text{Cl} \cdot 2\text{H}_2\text{O}$.

SOLUBILITY IN WATER.

(Meerburg.)

| t°. | Gms. $\text{CuCl}_2 \cdot 2\text{NH}_4\text{Cl}$ per 100 Gms. Solution. | Solid Phase. | t°. | Gms. $\text{CuCl}_2 \cdot 2\text{NH}_4\text{Cl}$ per 100 Gms. Solution. | Solid Phase. |
|-------|--|---|-----|--|---|
| -10.5 | 3.87 | Ice | 30 | 27.70 | $\text{CuCl}_2 \cdot 2\text{NH}_4\text{Cl} \cdot 2\text{H}_2\text{O}$ |
| -10.8 | 20.12 | Ice | 40 | 30.47 | " |
| -11 | 20.3 | Ice + $\text{CuCl}_2 \cdot 2\text{NH}_4\text{Cl} \cdot 2\text{H}_2\text{O}$ | 50 | 33.24 | " |
| -10 | 20.46 | $\text{CuCl}_2 \cdot 2\text{NH}_4\text{Cl} \cdot 2\text{H}_2\text{O}$ | 60 | 36.13 | " |
| 0 | 22.02 | " | 70 | 39.35 | " |
| 12 | 24.26 | " | 80 | 43.36 | " |
| 20 | 25.95 | " | | | |

**SOLUBILITY OF CUPROUS CHLORIDE IN AQUEOUS SOLUTIONS OF CUPRIC
SULPHATE AT ABOUT 20°.**

(Bodländer and Storbeck — Z. anorg. Chem. 31, 22, '02.)

| Millimols per Liter. | | | | | Grams per Liter. | | | | |
|----------------------|-----------|-----------|---------|----------|-------------------|-----------|-----------|---------|----------|
| CuSO_4 . | Total Cu. | Total Cl. | Cu(ic). | Cu(ous). | CuSO_4 . | Total Cu. | Total Cl. | Cu(ic). | Cu(ous). |
| 0 | 2.880 | 5.312 | 2.258 | 0.622 | 0.0 | 0.183 | 0.188 | 0.143 | 0.040 |
| 0.987 | 3.602 | 4.908 | 3.145 | 0.457 | 0.158 | 0.229 | 0.174 | 0.200 | 0.029 |
| 1.975 | 4.553 | 4.687 | 4.131 | 0.422 | 0.315 | 0.290 | 0.166 | 0.263 | 0.027 |
| 2.962 | 5.193 | 4.256 | 4.625 | 0.509 | 0.473 | 0.330 | 0.151 | 0.292 | 0.032 |
| 4.937 | 7.276 | 4.329 | 6.546 | 0.730 | 0.788 | 0.463 | 0.154 | 0.416 | 0.046 |

**SOLUBILITY OF CUPROUS CHLORIDE IN AQUEOUS SOLUTIONS OF POTAS-
SIUM CHLORIDE AT ABOUT 20° EXCEPT FIRST DETERMINATION AT 16°.**

(Bodländer and Storbeck.)

| Millimols per Liter. | | | | | Grams per Liter. | | | | |
|----------------------|-----------|-----------|---------|----------|------------------|-----------|-----------|---------|----------|
| KCl. | Total Cu. | Total Cl. | Cu(ic). | Cu(ous). | KCl. | Total Cu. | Total Cl. | Cu(ic). | Cu(ous). |
| 0 | 2.851 | 5.416 | 2.222 | 0.629 | 0.0 | 0.181 | 0.193 | 0.141 | 0.040 |
| 2.5 | 1.955 | 6.015 | 1.421 | 0.534 | 0.186 | 0.124 | 0.213 | 0.090 | 0.034 |
| 5 | 1.522 | 7.525 | 1.008 | 0.514 | 0.373 | 0.097 | 0.267 | 0.069 | 0.033 |
| 10 | 1.236 | 11.735 | 0.475 | 0.761 | 0.746 | 0.079 | 0.416 | 0.030 | 0.048 |
| 20 | 1.446 | 21.356 | 0.324 | 1.122 | 1.492 | 0.092 | 0.759 | 0.021 | 0.071 |
| 50 | 2.411 | not det. | 0.1088 | 2.302 | 3.730 | 0.153 | not det. | 0.007 | 0.146 |
| 100 | 4.702 | " | 0.000 | 4.702 | 7.460 | 0.299 | " | 0.000 | 0.299 |
| 200 | 9.485 | " | 0.000 | 9.485 | 14.920 | 0.603 | " | 0.000 | 0.603 |
| 1000 | 97.0 | " | 0.000 | 97.0 | 74.60 | 6.170 | " | 0.000 | 6.170 |
| 2000 | 384.0 | " | 0.000 | 384.0 | 149.2 | 24.42 | " | 0.000 | 24.420 |

**SOLUBILITY OF COPPER CHLORIDE IN AQUEOUS SOLUTIONS OF SODIUM
CHLORIDE.**

(Hunt — Am. J. Sci. [2] 49, 154, '70.)

| t°. | Grams CuCl_2 per 100 cc. Solution of: | | |
|-----|--|-----------|----------|
| | Sat. NaCl. | 15% NaCl. | 5% NaCl. |
| 11 | 8.9 | 3.6 | ... |
| 40 | 11.9 | 6.0 | 1.1 |
| 90 | 16.9 | 10.3 | 2.6 |

SOLUBILITY OF COPPER CHLORIDE AND POTASSIUM CHLORIDE DOUBLE SALTS AND MIXTURES IN WATER.

(Meyerhoffer — Z. physik. Chem. 5, 102, '90.)

| t°. | Cl per 1 Gram Solution. | | Mols. per 100 Mols. H ₂ O. | | Solid Phase. |
|------|--------------------------------|-----------------|---------------------------------------|------|---|
| | Present as CuCl ₂ . | Present as KCl. | CuCl ₂ . | KCl. | |
| 39.4 | 0.120 | 0.107 | 5.56 | 9.93 | CuCl ₂ ·KCl·2H ₂ O + KCl |
| 49.9 | 0.129 | 0.115 | 6.39 | 11.4 | " |
| 60.4 | 0.142 | 0.125 | 7.71 | 13.6 | " |
| 79.1 | 0.168 | 0.142 | 11.1 | 18.8 | " |
| 90.5 | 0.188 | 0.154 | 14.9 | 24.4 | " |
| 93.7 | 0.194 | 0.156 | 16.2 | 26.0 | CuCl ₂ ·KCl + KCl |
| 98.8 | 0.197 | 0.162 | 17.5 | 28.7 | " |
| 0 | 0.214 | 0.021 | 9.84 | 1.94 | CuCl ₂ ·KCl·2H ₂ O + CuCl ₂ ·2H ₂ O |
| 39.6 | 0.232 | 0.049 | 12.9 | 5.44 | " |
| 50.1 | 0.233 | 0.059 | 13.7 | 6.90 | " |
| 52.9 | 0.241 | 0.062 | 14.8 | 7.63 | " |
| 60.2 | 0.246 | 0.066 | 15.8 | 8.49 | CuCl ₂ ·KCl + CuCl ₂ ·2H ₂ O |
| 72.6 | 0.255 | 0.063 | 16.8 | 8.35 | " |
| 64.2 | ... | ... | 14.9 | 11.6 | CuCl ₂ ·KCl·2H ₂ O + CuCl ₂ ·KCl |
| 72.5 | ... | ... | 14.8 | 15.0 | CuCl ₂ ·KCl |

SOLUBILITY OF CUPRIC CHLORIDE IN SEVERAL SOLVENTS.

(Etard — Ann. chim. phys. [7] 2, 564, '94; de Bruyn — Z. physik. Chem. 10, 783, '92; de Coninck — Compt. rend. 131, 59, '00; St. von Laszczynski — Ber. 27, 2285, '94.)

| Solvent. | Grams CuCl ₂ per 100 Grams Sat. Solution at: | | | | |
|--------------------|---|--------------|------------|------|------------|
| | 0°. | 15°. | 20°. | 40°. | 80°. |
| Methyl Alcohol | 36 | 40.5 (de B.) | 36.5 | 37.0 | ... |
| Ethyl Alcohol | 32 | 35.0 (de B.) | 35.7 | 39.0 | ... |
| Propyl Alcohol | 29 | ... | 30.5 | 30.5 | ... |
| Iso Propyl Alcohol | ... | ... | ... | 16.0 | 30.0 |
| n Butyl Alcohol | 15 | ... | 15.3 | 16.0 | 16.5 |
| Allyl Alcohol | 23 | ... | 23.0 | ... | ... |
| Ethyl Formate | 10 | ... | 9.0 | 8.0 | ... |
| Ethyl Acetate | ... | ... | 3.0 | 2.5 | 1.3 (72°) |
| Acetone (abs.) | 8.86* | 8.92† | 2.88 (18°) | ... | 1.40 (56°) |
| Acetone (80%) | ... | ... | 18.9‡ | ... | ... |
| Ether | ... | 0.043 (11°) | 0.11 | ... | ... |

* (CuCl₂·2 Aq.)† (CuCl₂·2 Aq.)‡ (23° CuCl₂·2 Aq.)

For the solubility of cupric chloride in mixtures of a number of organic solvents, see de Coninck.

SOLUBILITY OF CUPRIC CHLORIDE IN AQUEOUS ALCOHOL AT 11.5°.
(Böttker — Z. physik. Chem. 22, 507, '97.)

10 gms. of $\text{CuCl}_2 \cdot \text{H}_2\text{O}$ and the indicated amounts of CuCl_2 were added to 20 cc. portions of alcohol. The solutions shaken two hours, 5 cc. portions withdrawn.

| Vol. % Alcohol. | Gms. CuCl_2 Added. | Gms. per 5 cc. Solution. | | Vol. % Alcohol. | Gms. CuCl_2 Added. | Gms. per 5 cc. Solution. | |
|--------------------|--------------------------------|--------------------------|-------------------|--------------------|--------------------------------|--------------------------|-------------------|
| | | H_2O . | CuCl_2 . | | | H_2O . | CuCl_2 . |
| 89.3 | 0.0 | 0.794 | 1.137 | 99.3 | 0.223 | 0.330 | 1.295 |
| 92.0 | 0.0 | 0.648 | 1.090 | 99.3 | 0.887 | 0.247 | 1.639 |
| 96.3 | 0.0 | 0.478 | 1.116 | 99.3 | 1.540 | 0.191 | 2.086 |
| 99.3 | 0.0 | 0.369 | 1.208 | 99.3 | 1.957 | 0.164 | 2.400 |

COPPER NITRATE (ic) $\text{Cu}(\text{NO}_3)_2$.

SOLUBILITY IN WATER.

(Funk — Wiss. Abh. p. t. Reichanstalt, 3, 440, '00.)

| t°. | Gms. $\text{Cu}(\text{NO}_3)_2$ per 100 Gms. Solution. | Mols. $\text{Cu}(\text{NO}_3)_2$ per 100 Mols. H_2O . | Solid Phase. | t°. | Gms. $\text{Cu}(\text{NO}_3)_2$ per 100 Gms. Solution. | Mols. $\text{Cu}(\text{NO}_3)_2$ per 100 Mols. H_2O . | Solid Phase. |
|-----|---|--|--|-------|---|--|--|
| | | | | | | | |
| -23 | 36.08 | 5.42 | $\text{Cu}(\text{NO}_3)_2 \cdot 9\text{H}_2\text{O}$ | 20 | 55.58 | 12.0 | $\text{Cu}(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}$ |
| -20 | 40.92 | 6.65 | " | 26.4 | 63.39 | 16.7 | " |
| -21 | 39.52 | 6.27 | $\text{Cu}(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}$ | 25 | 60.01 | 14.4 | $\text{Cu}(\text{NO}_3)_2 \cdot 3\text{H}_2\text{O}$ |
| 0 | 45.00 | 7.87 | " | 40 | 61.51 | 15.2 | " |
| +10 | 48.79 | 9.15 | " | 60 | 64.17 | 17.2 | " |
| 18 | 53.86 | 11.20 | " | 80 | 67.51 | 20.0 | " |
| | | | | 114.5 | 77.59 | 33.3 | " |

Density of solution saturated at 18° = 1.681.

COPPER SULPHATE $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$.

SOLUBILITY IN WATER.

(Etard — Ann. chim. phys. [7] 2, 528, '94; Patrick and Aubert — Trans. Kansas Acad. Sci. 10, '74; at 15°, Cohen — Z. Electrochem. 9, 433, '03; at 25°, Trevor — Z. physik. Chem. 7, 470, '91.)

| t°. | Gms. CuSO_4 per 100 Gms. | | t°. | Gms. CuSO_4 per 100 Gms. | |
|-----|-----------------------------------|--------|-----|-----------------------------------|--------|
| | Solution. | Water. | | Solution. | Water. |
| 0 | 12.5 | 14.3 | 60 | 28.5 | 40.0 |
| 10 | 14.8 | 17.4 | 80 | 35.5 | 55.0 |
| 20 | 17.2 | 20.7 | 100 | 43.0 | 75.4 |
| 25 | 18.5 | 22.7 | 120 | 44.0 | 78.6 |
| 30 | 20.0 | 25.0 | 140 | 44.5 | 80.2 |
| 40 | 22.5 | 28.5 | 160 | 44.0 | 78.6 |
| 50 | 25.0 | 33.3 | 180 | 43.0 | 75.4 |

SOLUBILITY OF COPPER SULPHATE IN AQUEOUS SOLUTIONS OF SULPHURIC ACID AT 0°.

(Engel — Compt. rend. 104, 507, '87.)

| Milligram Equiv. per 10 Gms. H_2O . | | Sp. Gr. of Solutions. | Grams per 100 Grams H_2O . | |
|--|-------------------|--------------------------|---|-------------------|
| H_2SO_4 . | CuSO_4 . | | H_2SO_4 . | CuSO_4 . |
| 0.0 | 18.6 | 1.144 | 0.00 | 14.85 |
| 4.14 | 17.9 | 1.143 | 2.03 | 14.29 |
| 14.6 | 19.6 | 1.158 | 7.16 | 15.65 |
| 31.0 | 12.4 | 1.170 | 15.20 | 9.90 |
| 54.2 | 8.06 | 1.195 | 26.57 | 6.43 |
| 56.25 | 7.75 | 1.211 | 27.57 | 6.19 |
| 71.8 | 5.0 | 1.224 | 35.2 | 3.99 |

SOLUBILITY OF COPPER SULPHATE IN AQUEOUS SOLUTIONS OF AMMONIUM SULPHATE AT 0°.
(Engel — *Compt. rend.* 102, 114, '86.)

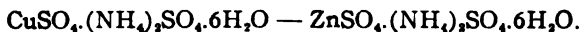
| Milligram Equiv. per 10 cc. Solution. | | Sp. Gr. of Solutions. | Grams per 100 cc. Solution. | |
|---|---------------------|--------------------------|---|---------------------|
| (NH ₄) ₂ SO ₄ . | CuSO ₄ . | | (NH ₄) ₂ SO ₄ . | CuSO ₄ . |
| 0.0 | 18.52 | 1.144 | 0.0 | 14.79 |
| 5.45 | 20.15 | 1.190 | 3.61 | 16.09 |
| 7.0 | 10.5 | 1.108 | 4.63 | 8.38 |
| 7.4 | 9.1 | 1.099 | 4.90 | 7.26 |
| 8.45 | 6.425 | 1.0815 | 5.59 | 5.13 |
| 11.35 | 3.7 | 1.071 | 7.51 | 2.95 |
| 18.6 | 1.178 | 1.082 | 12.31 | 0.94 |
| 31.2 | 1.0 | 1.116 | 20.65 | 0.80 |

MIXTURES OF COPPER AMMONIUM SULPHATE AND NICKEL AMMONIUM SULPHATE IN WATER AT 13°-14°.
(Fock — *Z. Kryst. Min.* 28, 394, '97.)



| Mol. % in Solution. | | Mols. per 100 Mols. H ₂ O. | | Mol. % in Solid Phase. | |
|---------------------|----------|---------------------------------------|----------|------------------------|----------|
| Cu. Salt. | Ni Salt. | Cu Salt. | Ni Salt. | Cu. Salt. | Ni Salt. |
| 0.00 | 100.00 | 0.00 | 0.521 | 0.00 | 100.00 |
| 33.34 | 66.66 | 0.1476 | 0.295 | 10.29 | 89.71 |
| 56.05 | 43.95 | 0.2664 | 0.2089 | 30.59 | 69.41 |
| 73.89 | 26.20 | 0.4165 | 0.1449 | 52.23 | 47.77 |
| 79.92 | 20.08 | 0.4785 | 0.1202 | 78.80 | 21.20 |
| 100.00 | 0.00 | 1.0350 | 0.00 | 100.0 | 0.00 |

MIXTURES OF COPPER AMMONIUM SULPHATE AND ZINC AMMONIUM SULPHATE IN WATER AT 13°-14°.
(Fock.)



| Mol. % in Solution. | | Mols. per 100 Mols. H ₂ O. | | Mol. % in Solid Phase. | |
|---------------------|----------|---------------------------------------|----------|------------------------|----------|
| Cu. Salt. | Zn Salt. | Cu Salt. | Zn Salt. | Cu. Salt. | Zn Salt. |
| 4.97 | 95.03 | 0.0422 | 0.8069 | 2.39 | 97.61 |
| 10.65 | 89.35 | 0.0666 | 0.5638 | 4.52 | 95.48 |
| 19.24 | 80.76 | 0.1218 | 0.5115 | 9.03 | 90.97 |
| 30.19 | 69.81 | 0.2130 | 0.4924 | 14.67 | 85.33 |
| 44.44 | 55.56 | 0.3216 | 0.4022 | 22.62 | 77.38 |
| 100.00 | 0.00 | 1.035 | 0.000 | 100 | 0.000 |

SOLUBILITY OF COPPER SULPHATE IN AQUEOUS SOLUTIONS OF MAGNESIUM SULPHATE AT 0°.
(Diacon — *Jahresber. Chem.* 61, '66.)

| Grams per 100 Gms. H ₂ O. | | Solid Phase. | Grams per 100 Gms. H ₂ O. | | Solid Phase. |
|--------------------------------------|---------------------|---|--------------------------------------|---------------------|--------------------------------------|
| CuSO ₄ . | MgSO ₄ . | | CuSO ₄ . | MgSO ₄ . | |
| 0 | 26.37 | MgSO ₄ ·6H ₂ O | 12.03 | 15.67 | CuSO ₄ ·5H ₂ O |
| 2.64 | 25.91 | " | 13.61 | 8.64 | " |
| 4.75 | 25.30 | " | 14.99 | 0.00 | " |
| 9.01 | 23.30 | MgSO ₄ ·6H ₂ O + CuSO ₄ ·5H ₂ O | | | |

COPPER SULPHATE

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COPPER SULPHATE, MANGANESE SULPHATE, MIXED CRYSTALS AT 25°.

(Stortenbecker — Z. physik. Chem. 34, 112, '00.)

| Gms. per 100 Gms. H ₂ O. | | Mols. per 100 Mols. H ₂ O. | | Mol. % Cu in Solution. | Mol. % Cu in Crystals. |
|---|---------------------|---------------------------------------|-------|---------------------------|---------------------------|
| CuSO ₄ . | MnSO ₄ . | Cu. | Mn. | | |
| Triclinic Crystals with 5H ₂ O. | | | | | |
| 20.2 | 0 | 2.282 | 0 | 100 | 100 |
| | | | | 90.5 | 99.3 |
| 19.76 | 3.69 | 2.23 | 0.44 | 83.5 | ... |
| | | | | 74.1 | 97.3 |
| | | | | 57.7 | 95.1 |
| | | | | 31.0 | 81.3 |
| 13.65 | 31.52 | 1.54 | 3.76 | 29.0 | ... |
| | | | | 26.1 | 70.4 |
| 11.61 | 39.41 | 1.31 | 4.70 | 21.8 | ... |
| | | | | 21.2 | 42.6 |
| | | | | 20.0 | 34.4 |
| 9.39 | 46.77 | 1.06 | 5.59 | 15.9 | 22.9 |
| | | | | 13.45* | 15.2* |
| 6.47 | 53.39 | 0.73 | 6.37 | 10.27 | 10.5 |
| | | | | 5.0 | 4.9 |
| 3.01 | 58.93 | 0.34 | 7.03 | 4.6 | ... |
| | | | | 2.31 | 2.15 |
| 0.0 | 61.83 | 0.0 | 7.375 | 0.0 | 100.0 |
| Monoclinic Crystals with 7H ₂ O. | | | | | |
| | | | | 20.0 | 28.2 |
| 9.39 | 46.77 | 1.06 | 5.58 | 15.9 | 23.5 |
| | | | | 13.45 | 20.8 |
| 6.47 | 53.39 | 0.73 | 6.37 | 10.27 | 16.0 |
| | | | | 4.6* | 5.8* |
| 0.0 | 67.07± | 0.0 | 8±* | 0.0 | 100 |

* Indicates points of labil equilibrium.

COPPER SULPHATE, ZINC SULPHATE, MIXED CRYSTALS IN WATER.

(Stortenbecker — Z. physik. Chem. 22, 62, '97.)

| Mols. per 100 Mols. H ₂ O. | | Mol. % Cu in Solution. | Mol. % Cu in Crystals. | |
|---------------------------------------|------|---------------------------|---------------------------|---|
| Cu. | Zn. | | | |
| 2.28 | 0 | 100 | 100 | Triclinic Crystals with 5H ₂ O. |
| 1.83 | 2.08 | 46.8 | 94.9 | |
| 1.41 | 3.60 | 28.1 | 86.4 | |
| 1.19 | 5.01 | 19.2 | 77.9 | |
| 1.86 | 3.36 | 36.2 | 40.4 | |
| 1.22 | 4.45 | 21.5 | 29.5-31.9 | Monoclinic Crystals with 7H ₂ O. |
| 1.01 | 4.72 | 17.6 | 24.1-28. | |
| 0.82 | 5.03 | 14.0 | 19.0-22. | |
| 0.51 | 5.59 | 8.36 | 12.4-14.9 | |
| 0.30 | 5.56 | 4.87 | 7.02 | |
| 0.0 | 6.42 | 0.0 | 0 | Rhombic Crystals with 7H ₂ O. |
| 1.19 | 5.01 | 19.2 | 5.01 | |
| 0.51 | 5.59 | 8.36 | 1.97 | |
| 0.267 | 5.77 | 4.42 | 1.15 | |
| 0.0 | 5.94 | 0.0 | 0.00 | |

SOLUBILITY OF COPPER SULPHATE, SODIUM SULPHATE MIXTURES IN WATER.

(Koppel — Z. physik. Chem. 42, 8, '01-'02; Massol and Malde — Compt. rend. 133, 287, '01.)

| t°. | Gms. per 100 Gms. Solution. | | Mols. per 100 Mols. H ₂ O. | | Solid Phase. |
|-------|-----------------------------|-----------------------------------|--|-----------------------------------|---|
| | CuSO ₄ . | Na ₂ SO ₄ . | CuSO ₄ . | Na ₂ SO ₄ . | |
| 0 | 13.40 | 6.23 | 1.88 | 0.98 | CuSO ₄ .5H ₂ O + Na ₂ SO ₄ .10H ₂ O |
| 10 | 14.90 | 9.46 | 2.23 | 1.56 | " |
| 15 | 15.18 | 11.64 | 2.23 | 2.02 | " |
| 17.7 | 14.34 | 13.34 | 2.24 | 2.34 | CuSO ₄ .Na ₂ SO ₄ .6H ₂ O |
| 23.0 | 14.36 | 12.76 | 2.23 | 2.21 | " |
| 40.15 | 13.73 | 12.26 | 2.10 | 2.10 | " |
| 17.7 | 14.99 | 13.48 | 2.37 | 2.39 | CuSO ₄ .Na ₂ SO ₄ .6H ₂ O + CuSO ₄ .5H ₂ O |
| 23 | 16.41 | 11.35 | 2.57 | 1.99 | " |
| 40.15 | 20.56 | 8.0 | 3.25 | 1.47 | " |
| 18 | 13.53 | 13.84 | 2.10 | 2.41 | CuSO ₄ .Na ₂ SO ₄ .6H ₂ O + Na ₂ SO ₄ .10H ₂ O |
| 20 | 11.34 | 15.70 | 1.76 | 2.73 | " |
| 25 | 6.28 | 21.20 | 0.98 | 3.70 | " |
| 30 | 2.607 | 28.38 | 0.43 | 5.21 | " |
| 33.9 | 1.475 | 32.30 | 0.25 | 6.18 | " |
| 37.2 | 1.494 | 31.96 | 0.25 | 6.08 | " |
| 30 | 5.38 | 22.17 | } CuSO ₄ .Na ₂ SO ₄ .6H ₂ O + increasing amts. of Na ₂ SO ₄ .10H ₂ O | | |
| 30.1 | 3.69 | 25.37 | | | |
| 30 | 1.57 | 32.09 | | | |

SOLUBILITY OF COPPER POTASSIUM SULPHATE CuK₂(SO₄)₂.6H₂O in WATER AT 25°.

100 gms. H₂O dissolve 11.14 gms. CuK₂(SO₄)₂.

(Trevor — Z. physik. Chem. 7, 470, '01.)

SOLUBILITY OF COPPER SULPHATE IN METHYL AND ETHYL ALCOHOL, ETC.

(de Bruyn — Z. physik. Chem. 10, 786, '92; de Coninck — Bull. acad. roy. Belgique, 257, '05.)

| Solvent. | t°. | Gms. per 100 Gms. Solvent. | | SOLUBILITY IN AQUEOUS ALCOHOL AT 15°. | |
|---------------------|------|----------------------------|---------------------------------------|---|---|
| | | CuSO ₄ . | CuSO ₄ .5H ₂ O. | | |
| Methyl Alcohol Abs. | 18 | 1.05 | 15.6 | (Schiff — Liebig's Ann. 118, 365, '61.) | |
| " 93.5% | 18 | ... | 0.93 | Wt. % Alcohol. | Gms. CuSO ₄ .5H ₂ O per 100 g. Solvent |
| " 50% | 18 | ... | 0.40 | | |
| " Abs. | 3 | ... | 13.4 | 10 | 15.3 |
| Ethyl Alcohol Abs. | 3 | ... | 1.1 | 20 | 3.2 |
| Glycol | 14.6 | ... | 7.6* | 40 | 0.25 |
| Glycerine | 15.5 | ... | 30.0 | | |

* Per 100 g. sol.

COPPER SULPHIDE CuS.

SOLUBILITY IN AQUEOUS SUGAR SOLUTIONS.

(Stolle — Z. Ver. Zuckerind. 50, 340, '00.)

| % Sugar in Solvent. | Gms. CuS per Liter of Aq. Sugar Solution at: | | |
|------------------------|--|--------|--------|
| | 17.5°. | 45°. | 75°. |
| 10 | 0.5672 | 0.3659 | 1.1345 |
| 30 | 0.8632 | 0.7220 | 1.2033 |
| 50 | 0.9076 | 1.0589 | 1.2809 |

COPPER TARTRATE

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COPPER TARTRATE $\text{CuC}_4\text{O}_6\text{H}_4 \cdot 3\text{H}_2\text{O}$.

SOLUBILITY IN WATER.

(Cantoni and Zachoder — Bull. soc. chim. [3] 33, 751, '05.)

| t°. | Gms. $\text{CuC}_4\text{O}_6\text{H}_4 \cdot 3\text{H}_2\text{O}$ per 100 cc. Solution. | t°. | Gms. $\text{CuC}_4\text{O}_6\text{H}_4 \cdot 3\text{H}_2\text{O}$ per 100 cc. Solution. | t°. | Gms. $\text{CuC}_4\text{O}_6\text{H}_4 \cdot 3\text{H}_2\text{O}$ per 100 cc. Solution. |
|-----|--|-----|--|-----|--|
| 15 | 0.0197 | 40 | 0.1420 | 65 | 0.1767 |
| 20 | 0.0420 | 45 | 0.1708 | 70 | 0.1640 |
| 25 | 0.0690 | 50 | 0.1920 | 75 | 0.1566 |
| 30 | 0.0890 | 55 | 0.2124 | 80 | 0.1440 |
| 35 | 0.1205 | 60 | 0.1970 | 85 | 0.1370 |

CRESOL $\text{C}_6\text{H}_4(\text{OH})\cdot\text{CH}_3$ *o*, *m* and *p*.

SOLUBILITY IN WATER AT 20°.

(Vaubel — J. pr. Chem. [2] 52, 72, '95.)

100 grams of the saturated aqueous solution contain :

2.45 grams *o* cresol, 2.18 grams *m* cresol, 1.94 grams *p* cresol.

DISTRIBUTION OF CRESOL BETWEEN WATER AND ETHER.

(Vaubel — J. pr. Chem. [2] 67, 472, '03.)

| Composition of Solvent. | Gms. Cresol in H_2O Layer. | In Ether Layer. |
|---|--|-----------------|
| 200 cc. H_2O + 100 cc. Ether | 0.0570 | 1.0760 |
| 200 cc. H_2O + 200 c.c. Ether | 0.0190 | 1.1144 |

CUMINIC ACID $\text{C}_9\text{H}_7\text{C}_6\text{H}_4\cdot\text{COOH}$ (*p* Iso Propyl Benzoic Acid).

SOLUBILITY IN WATER AT 25°.

(Paul — Z. physik. Chem. 14, 111, '94.)

1000 cc. sat. solution contain 0.1519 gm. or 0.926 millimol Cuminic Acid.

Pseudo **CUMIDIN** $(\text{CH}_3)_3\text{C}_6\text{H}_3\cdot\text{NH}_2$ (*s*, 5 Amino, 1. 2. 4, Trimethyl phen).

SOLUBILITY IN WATER.

(Lowenherz — Z. physik. Chem. 25, 412, '98.)

| t°. | 19.4°. | 23.7°. | 28.7°. |
|--|--------|--------|--------|
| Gms. ψ Cumidin per liter H_2O | 1.198 | 1.330 | 1.498 |

CYANOGEN CN .

SOLUBILITY IN SEVERAL SOLVENTS AT 20°.

(Gay Lussac.)

| Solvent. | Vols. CN per 1 Vol. Solvent. |
|-------------------|---------------------------------------|
| Water | 4.5 |
| Alcohol | 23.0 |
| Ether | 5.0 |
| Oil of Turpentine | 5.0 |

DIDYMIUM SULPHATE $\text{Di}_2(\text{SO}_4)_3$.

SOLUBILITY IN WATER.

(Marignac — Ann. chim. phys. [3] 38, 170, '53.)

| t°. | Gms. $\text{Di}_2(\text{SO}_4)_3$ per 100 Gms. H_2O . | Solid Phase. | t°. | Gms. $\text{Di}_2(\text{SO}_4)_3$ per 100 Gms. H_2O . | Solid Phase. |
|-----|---|------------------------------|-----|---|--|
| 12 | 43.1 | $\text{Di}_2(\text{SO}_4)_3$ | ? | 34.0 | $\text{Di}_2(\text{SO}_4)_3 \cdot 6\text{H}_2\text{O}$ |
| 18 | 25.8 | " | 19 | 11.7 | $\text{Di}_2(\text{SO}_4)_3 \cdot 8\text{H}_2\text{O}$ |
| 25 | 20.6 | " | 40 | 8.8 | " |
| 38 | 13.0 | " | 50 | 6.5 | " |
| 50 | 11.0 | " | 100 | 1.8 | " |

DIDYMIUM POTASSIUM SULPHATE $\text{K}_2\text{SO}_4 \cdot \text{Di}_2(\text{SO}_4)_3 \cdot 2\text{H}_2\text{O}$.

(Marignac.)

100 gms. H_2O dissolve 1.6 grams double salt at 18°.**ERBIUM SULPHATE** $\text{Er}_2(\text{SO}_4)_3$.

SOLUBILITY IN WATER.

(Hoglund.)

100 gms. H_2O dissolve 43.0 gms. $\text{Er}_2(\text{SO}_4)_3$ at 0°.100 gms. H_2O dissolve 23.0 gms. $\text{Er}_2(\text{SO}_4)_3 \cdot 8\text{H}_2\text{O}$ at 20°.**ERYTHRITE** $\text{CH}_2\text{OH}(\text{CHOH})_2\text{CH}_2\text{OH}$.

100 grams saturated solution in pyridine contain 250 gms. at 26°.

(Holtz — J. Physic. Chem. 9, 764, '55.)

ETHANE C_2H_6 .

SOLUBILITY IN WATER.

(Winkler — Ber. 34, 1421, '01.)

| t°. | β . | β' . | q. | t°. | β . | β' . | q. |
|-----|-----------|------------|--------|-----|-----------|------------|--------|
| 0 | 0.0987 | 0.0982 | 0.0132 | 40 | 0.0292 | 0.0271 | 0.0037 |
| 5 | 0.0803 | 0.0796 | 0.0107 | 50 | 0.0246 | 0.0216 | 0.0029 |
| 10 | 0.0656 | 0.0648 | 0.0087 | 60 | 0.0218 | 0.0175 | 0.0024 |
| 15 | 0.0550 | 0.0541 | 0.0073 | 70 | 0.0195 | 0.0135 | 0.0018 |
| 20 | 0.0472 | 0.0462 | 0.0062 | 80 | 0.0183 | 0.0097 | 0.0013 |
| 25 | 0.0410 | 0.0398 | 0.0054 | 90 | 0.0176 | 0.0054 | 0.0007 |
| 30 | 0.0362 | 0.0347 | 0.0049 | 100 | 0.0172 | 0.0000 | 0.0000 |

β = Absorption coefficient, *i.e.*, the volume of gas (reduced to 0° and 760 mm.) absorbed by 1 volume of the liquid when the pressure of the gas itself without the tension of the liquid amounts to 760 mm.

β' = Solubility, *i.e.*, the volume of gas (reduced to 0° and 760 mm.) which is absorbed by one volume of the liquid when the barometer indicates 760 mm. pressure.

q = the weight of gas in grams which is taken up by 100 grams of the pure solvent at the indicated temperature and a total pressure (that is, the partial pressure of the gas plus the vapor pressure of the liquid at the absorption temperature) of 760 mm.

ETHER (C_2H_5)₂O.

RECIPROCAL SOLUBILITY OF ETHER AND WATER.

(Klobbie — Z. physik. Chem. 24, 619, '97; Schuncke — *Ibid.* 14, 334, '94; St. Tolloczko — *Ibid.* 20, 407, '96.)Solubility of Ether in Water.
Lower Layer — Aqueous.

| t°. | Gms. (C_2H_5) ₂ O per 100 Gms. | |
|-----|---|-----------|
| | Water. | Solution. |
| 0 | 13.12 | 11.6 |
| 5 | 11.4 | 10.2 |
| 10 | 9.5 | 8.7 |
| 15 | 8.2 | 7.6 |
| 20 | 6.95 | 6.5 |
| 25 | 6.05 | 5.7 |
| 30 | 5.4 | 5.1 |
| *40 | 4.7 | 4.5 |
| *50 | 4.3 | 4.1 |
| *60 | 3.8 | 3.7 |
| *70 | 3.3 | 3.2 |
| *80 | 2.9 | 2.8 |

Solubility of Water in Ether.
Upper Layer — Ethereal.

| | Gms. H ₂ O per 100 Gms. | |
|--|------------------------------------|-----------------|
| | Ether. | Solution. |
| | 1.01 | 1.0 |
| | 1.06 | 1.05 |
| | 1.12 | 1.12 (2.6, S.) |
| | 1.16 | 1.15 |
| | 1.20 | 1.20 (2.65, S.) |
| | 1.26 | 1.26 |
| | 1.33 | 1.32 |
| | 1.52 | 1.50 |
| | 1.73 | 1.7 |
| | 1.83 | 1.8 |
| | 2.04 | 2.0 |
| | 2.25 | 2.2 |

* Indicates determinations made by Synthetic Method, for which see page 9.

100 cc. H₂O dissolve 8.11 cc. ether at 22°; Vol. of solution 107.145 cc., Sp. Gr. 0.9853.100 cc. ether dissolve 2.93 cc. H₂O at 22°; Vol. of solution 103.282, Sp. Gr. 0.7164.

(Herz — Ber. 31, 2671, '98.)

For recent determinations of the density of ether, see Christomanos — Z. anorg. Chem. 45, 136, '05.

SOLUBILITY OF ETHER IN AQUEOUS SOLUTIONS OF HYDROCHLORIC ACID.

(Schuncke — Z. physik. Chem. 14, 334, '94; in 38.52% HCl, Draper — Chem. News, 35, 87, '77.)

| In 38.52 % HCl. | | | In 31.61 % HCl. | | | In 20 % HCl. | | |
|-----------------|--------------------------------|--|---|---|--|---|--------------------------------------|---|
| t°. | cc. Ether per 100 cc. Solvent. | cc. Ether per 100 cc. Solvent. | Gms. per 1 Gram H ₂ O. HCl. | Gram H ₂ O. (C_2H_5) ₂ O. | | cc. Ether per 100 cc. Solvent. | Gms. per 1 g. H ₂ O. HCl. | Gram H ₂ O. (C_2H_5) ₂ O. |
| -6 | 181 | 149 | 0.4622 | 1.387 | | 67.2 | 0.253 | 0.5637 |
| 0 | 177.5 | 142 | 0.4622 | 1.308 | | 58.3 | 0.253 | 0.4863 |
| +6 | 172.5 | 131.5 | 0.4622 | 1.2075 | | 51.1 | 0.253 | 0.4231 |
| 15 | 163 | 121.7 (14°) | 0.4622 | 1.1075 | | 40.5 | 0.253 | 0.3290 |
| 20 | 158 | 116.9 (20.8°) | 0.4622 | 1.0005 | | 33.1 | 0.253 | 0.2688 |
| 26 | 135 | 104.2 | 0.4622 | 0.9360 | | 27.5 | 0.253 | 0.2221 |
| In 12.58 % HCl. | | | In 3.65 % HCl. | | | | | |
| t°. | cc. Ether per 100 cc. Solvent. | Gms. per 1 Gram H ₂ O. HCl. | Gram H ₂ O. (C_2H_5) ₂ O. | cc. Ether per 100 cc. Solvent. | Gms. per 1 Gram H ₂ O. HCl. | Gram H ₂ O. (C_2H_5) ₂ O. | | |
| -6 | 26.45 | 0.144 | 0.2106 | 19.23 | 0.0308 | 0.1454 | | |
| 0 | 22.19 | 0.144 | 0.1748 | ... | ... | ... | | |
| +6 | 19.18 | 0.144 | 0.1503 | 14.31 | 0.0308 | 0.1070 | | |
| 15 | 15.61 | 0.144 | 0.1210 | 11.83 | 0.0308 | 0.0868 | | |
| 20 | 13.76 | 0.144 | 0.1059 | 10.52 | 0.0308 | 0.0769 | | |
| 26 | 12.70 | 0.144 | 0.0970 | 9.24 | 0.0308 | 0.0673 | | |

SOLUBILITY OF ETHER IN AQUEOUS SALT, ETC., SOLUTIONS AT 18°.

(Euler — Z. physik. Chem. 49, 306, '04.)

| Aq. Solution of: | Gms. per Liter Added Salt. | Gms. (C ₂ H ₅) ₂ O per 100 cc. Solvent. | Aq. Solution of: | Gms. per Liter Added Salt. | Gms. (C ₂ H ₅) ₂ O per 100 cc. Solvent. |
|------------------|----------------------------|---|---------------------------------|----------------------------|---|
| Water | 0.0 | 7.8 | Na ₂ SO ₄ | 59.54 | 3.7 |
| KNO ₃ | 101.19 | 5.4 | Mannite | 91.06 | 6.7 |
| KCl | 73.6 | 4.7 | H ₂ SO ₄ | 49.0 | 6.6 |
| LiCl | 42.48 | 5.2 | " | 122.5 | 5.65 |
| NaCl | 58.5 | 4.5 | " | 245.0 | 4.55 |

SOLUBILITY OF ETHER IN AQUEOUS ETHYL ALCOHOL AND IN AQUEOUS METHYL ALCOHOL MIXTURES AT 20°.

(Bancroft — Phys. Rev. 3, 122, '95-'96.)

In Ethyl Alcohol.

In Methyl Alcohol.

| Per 5 cc. Alcohol. | | Per 5 cc. Alcohol. | | Per 1 cc. CH ₃ OH. | | Per 1 cc. CH ₃ OH. | |
|------------------------|---|------------------------|---|-------------------------------|--|-------------------------------|--|
| cc. H ₂ O.* | cc. (C ₂ H ₅) ₂ O.† | cc. H ₂ O.* | cc. (C ₂ H ₅) ₂ O.† | cc. H ₂ O. | cc. (C ₂ H ₅) ₂ O. | cc. H ₂ O. | cc. (C ₂ H ₅) ₂ O. |
| 50 | 1.30 | 4.45 | 7.0 | 10 | 1.13 | 0.83 | 1.80 |
| 25 | 1.70 | 4.0 | 7.8 | 7 | 0.85 | 0.64 | 3.00 |
| 10 | 2.41 | 3.87 | 8.0 | 4 | 0.60 | 0.52 | 5.0 |
| 8 | 3.35 | 3.10 | 10.0 | 2.5 | 0.56 | 0.44 | 10.0 |
| 6 | 5.10 | 2.08 | 15.0 | 1.8 | 0.63 | 0.45 | 15.0 |
| 5.21 | 6.00 | 1.77 | 17.5 | 1.0 | 1.23 | | |

* Saturated with ether.

† Saturated with water.

ETHYL ACETATE CH₃COOC₂H₅.

SOLUBILITY IN WATER AND IN AQUEOUS SALT SOLUTIONS AT 28°.

(Euler — Z. physik. Chem. 31, 365, '99; 49, 306, '04.)

| Solvent. | Conc. of Salt Solution. | | CH ₃ COOC ₂ H ₅ per Liter. | | Solvent. | Conc. of Salt Solution. | | CH ₃ COOC ₂ H ₅ per Liter. | |
|------------------|-------------------------|-----------------|---|--------|---------------------------------|-------------------------|-----------------|---|--------|
| | Nor-mality. | Gms. per Liter. | Gram Mols. | Grams. | | Nor-mality. | Gms. per Liter. | Gram Mols. | Grams. |
| Water | 0 | 0 | 0.825 | 75.02 | NaCl (at 18°) | $\frac{1}{2}$ | 14.62 | 0.76 | 67.0 |
| KNO ₃ | $\frac{1}{2}$ | 50.59 | 0.77 | 67.81 | " | $\frac{1}{2}$ | 29.25 | 0.67 | 59.0 |
| " | 1 | 101.19 | 0.72 | 63.40 | " | 1 | 58.5 | 0.51 | 45.0 |
| " | 2 | 202.38 | 0.625 | 55.04 | Na ₂ SO ₄ | 1 | 71.08 | 0.465 | 40.96 |
| KCl | $\frac{1}{2}$ | 18.4 | 0.747 | 65.79 | " (at 18°) | $\frac{1}{2}$ | 35.54 | 0.61 | 54.0 |
| " | $\frac{1}{2}$ | 36.8 | 0.685 | 65.33 | " | 1 | 71.08 | 0.42 | 37.0 |
| " | 1 | 73.6 | 0.575 | 50.64 | MgSO ₄ | $\frac{1}{2}$ | 16.30 | 0.733 | 64.55 |
| " | 2 | 147.2 | 0.41 | 36.11 | " | $\frac{1}{2}$ | 32.6 | 0.655 | 57.68 |
| NaCl | $\frac{1}{2}$ | 14.62 | 0.745 | 65.61 | " | 1 | 65.21 | 0.505 | 44.47 |
| " | $\frac{1}{2}$ | 29.25 | 0.677 | 59.62 | ZnSO ₄ | $\frac{1}{2}$ | 20.18 | 0.733 | 64.55 |
| " | 1 | 58.5 | 0.545 | 47.99 | " | $\frac{1}{2}$ | 40.36 | 0.653 | 57.50 |
| " | 2 | 117.0 | 0.315 | 27.74 | " | 1 | 80.73 | 0.500 | 44.03 |

ETHYL ACETATE

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SOLUBILITY OF ETHYL ACETATE IN AQUEOUS ETHYL ALCOHOL, METHYL ALCOHOL, AND ACETONE MIXTURES AT 20°.

(Bancroft — Phys. Rev. 3, 122, 131, '95-'96.)

| In Ethyl Alcohol. | | In Methyl Alcohol. | | In Acetone. | |
|------------------------|-----------------------|----------------------|-----------------------|--------------------------|-----------------------|
| Per 1 cc. C_2H_5OH . | | Per 1 cc. CH_3OH . | | Per 1 cc. $(CH_3)_2CO$. | |
| cc. H_2O .* | cc. $CH_3COOC_2H_5$ † | cc. H_2O . | cc. $CH_3COOC_2H_5$. | cc. H_2O . | cc. $CH_3COOC_2H_5$. |
| 10 | 0.25 | 10 | 1.08 | 10 | 1.01 |
| 8 | 0.27 | 3 | 0.68 | 5 | 0.60 |
| 4 | 0.35 | 1.5 | 1.69 | 2 | 0.43 |
| 2 | 1.02 | 1.20 | 2.50 | 1.5 | 0.47 |
| 1.06 | 2.50 | 1.0 | 4.9 | 1.0 | 0.63 |
| 0.65 | 5.0 | 0.98 | 7.0 | 0.8 | 0.74 |
| 0.54 | 7.0 | 1.0 | 8.0 | 0.51 | 1.00 |
| 0.44 | 10.0 | 1.03 | 10.0 | 0.25 | 2.00 |
| | | | | 0.29 | 5.00 |

* Saturated with ethyl acetate.

† Saturated with water.

100 cc. H_2O dissolve 7.26 g. ethyl acetate at 28°.

(Euler — Z. physik. Chem. 31, 360, '99.)

100 cc. H_2O dissolve 9.26 cc. ethyl acetate at 20°.

100 cc. ethyl acetate dissolve 2.94 cc. water at 20°.

ETHYL BUTYRATE $C_3H_7COOC_2H_5$.**SOLUBILITY IN WATER AND IN AQUEOUS ETHYL ALCOHOL MIXTURES AT 20°.**100 g. H_2O dissolve 0.5 g. ethyl butyrate at 22°.

(Traube — Ber. 17, 2304, '84.)

100 cc. H_2O dissolve 0.8 cc. ethyl butyrate at 20°.

(Bancroft.)

100 cc. ethyl butyrate dissolve 0.4 — 0.5 cc. H_2O at 20°.

| | | | | | | |
|---------------|-------------------------|------|------|------|------|------|
| Per 5 cc. | { cc. H_2O | 10 | 6 | 4 | 2.96 | 2.10 |
| Ethyl Alcohol | { cc. $C_3H_7COOC_2H_5$ | 0.34 | 0.96 | 2.47 | 4.00 | 6.0 |

ETHYL FORMATE $HCOOC_2H_5$.

100 grams water dissolve 10 grams ethyl formate at 22°. (Traube.)

ETHYL PROPIONATE $C_2H_5COOC_2H_5$.**SOLUBILITY IN WATER AND IN AQUEOUS ETHYL ALCOHOL MIXTURES.**

(Bancroft.)

100 grams H_2O dissolve 1.7 grams ethyl propionate at 22°. (Traube.)

| cc. Alcohol in Mixture. | cc. H_2O to cause separation of a second phase in mixtures of the given amounts of Alcohol and 3 cc. portions of Ethyl Propionate. |
|----------------------------|--|
| 3 | 2.32 |
| 6 | 6.87 |
| 9 | 12.35 |
| 12 | 19.17 |
| 15 | 27.12 |
| 18 | 36.84 |
| 21 | 50.42 |
| 24 | ∞ |

ETHYL VALERATE $C_4H_9COOC_2H_5$.**ETHYL (Iso) VALERATE** $(CH_3)_2CH.CH_2COOC_2H_5$.

SOLUBILITY OF EACH IN WATER AND IN AQUEOUS ALCOHOL MIXTURES AT 20°.

(Bancroft.)

100 cc. water dissolve 0.3 cc. ethyl valerate at 25°.

100 cc. water dissolve 0.2 cc. ethyl iso valerate at 20°.

100 cc. ethyl iso valerate dissolve 0.4+ cc. water at 20°.

| Mixtures of Ethyl Alcohol, Ethyl Valerate and Water. | | | | Mixtures of Ethyl Alcohol, Ethyl Iso Valerate and Water. | |
|---|------------------------|---------------|------------------------|---|----------------------------|
| cc. Alcohol.* | cc. H ₂ O.† | cc. Alcohol.* | cc. H ₂ O.† | Per 5 cc. Ethyl Alcohol. | |
| | | | | cc. H ₂ O. | cc. Ethyl Iso Valerate. |
| 3 | 1.42 | 39 | 53.13 | | |
| 9 | 7.18 | 45 | 63.60 | 10 | 0.15 |
| 15 | 14.13 | 57 | 90.53 | 8 | 0.23 |
| 21 | 22.40 | 72 | 131.0 | 6 | 0.46 |
| 27 | 31.62 | 81 | 180.0 | 5 | 0.72 |
| 33 | 41.62 | | | 4 | 1.23 |

* cc. Alcohol in mixture.

† cc. H₂O added to cause the separation of a second phase in mixtures of the given amounts of alcohol and 3 cc. portions of ethyl valerate.Di **ETHYL KETONE** (3 Pentanon) $(C_2H_5)_2CO$.

SOLUBILITY IN WATER.

(Rothmund — Z. physik. Ch. 26, 433, '98)

Determinations made by Synthetic Method, see page 9.

| t°. | Gms. Di Ethyl Ketone per 100 Gms. | | t°. | Gms. Di Ethyl Ketone per 100 Gms. | |
|-----|--------------------------------------|---------------|-----|--------------------------------------|---------------|
| | Aq. Layer. | Ketone Layer. | | Aq. Layer. | Ketone Layer. |
| 20 | 4.60 | ... | 100 | 3.68 | 93.10 |
| 40 | 3.43 | 97.42 | 120 | 4.05 | 90.18 |
| 60 | 3.08 | 96.18 | 140 | 4.76 | 87.01 |
| 80 | 3.20 | 94.92 | 160 | 6.10 | 83.33 |

ETHYL BROMIDE C_2H_5Br .

SOLUBILITY IN ETHER.

(Parmentier — Compt. rend. 114, 1002, '92.)

| t°. | -13°. | 0. | 12. | 22.5. | 32. |
|----------------------------------|-------|-----|-----|-------|-----|
| G. C_2H_5Br per 100 gms. Ether | 632 | 561 | 462 | 302 | 253 |

SOLUBILITY OF ETHYL BROMIDE, ETC., IN WATER.

(Rex — Z. physik. Chem. 55, 355, '06.)

| Dissolved Substance. | Grams per 100 Grams H ₂ O at: | | | |
|----------------------|--|-------|-------|-------|
| | 0°. | 10°. | 20°. | 30°. |
| Ethyl Bromide | 1.067 | 0.965 | 0.914 | 0.896 |
| Ethyl Iodide | 0.441 | 0.414 | 0.403 | 0.415 |
| Ethylene Chloride | 0.922 | 0.885 | 0.869 | 0.894 |
| Ethylidene Chloride | 0.656 | 0.595 | 0.550 | 0.540 |

ETHYL CARBAMATE $\text{CO}(\text{OC}_2\text{H}_5)_2\text{NH}_2$.

SOLUBILITY IN SEVERAL SOLVENTS AT 25°.

(U. S. P.)

| Solvent. | Water. | Alcohol. | Ether. | Chloroform. | Glycerine. |
|--|--------|----------|--------|-------------|------------|
| Gms. $\text{CO}(\text{OC}_2\text{H}_5)_2\text{NH}_2$ per 100 gms. solvent | 100+ | 166 | 100 | 77 | 33 |

ETHYLENE C_2H_4 .

SOLUBILITY IN WATER AND IN ALCOHOL.

(Bunsen and Carius; Winkler — Landolt and Börnstein, Tabellen, 3d ed. p. 604, '06.)

| t°. | β . | q . | Solubility in Alcohol. | |
|-----|-----------|--------|------------------------|--|
| 0 | 0.226 | 0.0281 | t°. | Vols. C_2H_4 per 100 Vols. Alcohol. |
| 5 | 0.191 | 0.0237 | | |
| 10 | 0.162 | 0.0200 | 0 | 359.5 |
| 15 | 0.139 | 0.0171 | 4 | 337.5 |
| 20 | 0.122 | 0.0150 | 10 | 308.6 |
| 25 | 0.108 | 0.0131 | 15 | 288.2 |
| 30 | 0.098 | 0.0118 | 20 | 271.3 |

For β and q see Ethane, page 133.

SOLUBILITY OF ETHYLENE IN METHYL ALCOHOL AND IN ACETONE.

(Levi — Gazz. chim. ital. 31, II, 513, '01.)

Results in terms of the Ostwald Solubility Expression l . See p. 105.

| t°. | In Methyl Alcohol. | In Acetone. | t°. | In Methyl Alcohol. | In Acetone. |
|-----|--------------------|-------------|-----|--------------------|-------------|
| 0 | 3.3924 | 4.0652 | 30 | 1.8585 | 1.8680 |
| 10 | 2.8831 | 3.3580 | 40 | 1.3432 | 1.0852 |
| 20 | 2.3718 | 2.6278 | 50 | 0.8259 | 0.2772 |
| 25 | 2.1154 | 2.2500 | 60 | 0.3506 | ... |

The formulas from which the above figures were calculated are:

$$\begin{aligned} \text{In Methyl Alcohol, } l &= 3.3924 - 0.05083 t - 0.00001 t^2. \\ \text{In Acetone, } l &= 4.0652 - 0.06946 t - 0.000126 t^2. \end{aligned}$$

FATS.

SOLUBILITY OF THE FATTY ACIDS OBTAINED FROM SEVERAL SOURCES
IN ALCOHOL AND IN BENZENE.

(Dubois and Pade — Bull. soc. chim. [2] 44, '85.)

| Crude Fatty Acid of: | Gms. Fat per 100 Gms. Abs. Alcohol at: | | | Gms. Fats per 100 Gms. Benzene at 12°. |
|----------------------------|---|-------|--------|--|
| | 0°. | 10°. | 26°. | |
| Mutton | 2.48 | 5.02 | 67.96 | 14.70 |
| Beef | 2.51 | 6.05 | 82.23 | 15.89 |
| Veal | 5.00 | 13.78 | 137.10 | 26.08 |
| Pork | 5.63 | 11.23 | 118.98 | 27.30 |
| Butter | 10.61 | 24.81 | 158.2 | 69.61 |
| Margarine | 2.37 | 4.94 | 47.06 | 13.53 |

FUMARIC ACID $\text{COOH} \cdot \text{CH} : \text{CH} \cdot \text{COOH}$.**MALËIC ACID** $(\text{CH})_2(\text{COOH})_2$.

SOLUBILITY IN WATER.

(Vaubel — J. pr. Chem. [2] 59, 30, '99.)

100 gms. water dissolve 0.672 gram fumaric acid at 165°.
 100 gms. water dissolve 50.0 grams malëic acid at 100°.

FURFUROL $\text{C}_6\text{H}_8\text{OCHO}$.

SOLUBILITY IN WATER.

(Rothmund — Z. physik. Chem. 26, 475, '98.)

Determinations by Synthetic Method, for which see page 9.

| t°. | Gms. $\text{C}_6\text{H}_8\text{OCHO}$ per 100 Gms. | | t°. | Gms. $\text{C}_6\text{H}_8\text{OCHO}$ per 100 Gms. | |
|-----|---|-----------------|-----------------------|---|-----------------|
| | Aq. Layer. | Furfural Layer. | | Aq. Layer. | Furfural Layer. |
| 40 | 8.2 | 93.7 | 100 | 18.9 | 83.5 |
| 50 | 8.6 | 93.0 | 110 | 24.0 | 78.5 |
| 60 | 9.2 | 92.0 | 115 | 28.0 | 74.6 |
| 70 | 10.8 | 90.7 | 120 | 34.4 | 68.1 |
| 80 | 13.0 | 89.0 | 122.7 (crit. t.) 51.0 | | |
| 90 | 15.5 | 86.6 | | | |

GADOLINIUM SULPHATE $\text{Gd}_2(\text{SO}_4)_3$.

SOLUBILITY IN WATER.

(Benedicks — Z. anorg. Chem. 22, 409, '00.)

| t°. | Gms. $\text{Gd}_2(\text{SO}_4)_3$ per 100 Gms H_2O . | Solid Phase. |
|------|---|--|
| | | $\text{Gd}_2(\text{SO}_4)_3 \cdot 8\text{H}_2\text{O}$ |
| 0 | 3.98 | " |
| 10 | 3.3 | " |
| 14 | 2.8 | " |
| 25 | 2.4 | " |
| 34.4 | 2.26 | " |

GALACTOSE $\text{C}_6\text{H}_{12}\text{O}_6$.

100 grams saturated solution in pyridine contain 5.45 grams $\text{C}_6\text{H}_{12}\text{O}_6$
 at 26°, density of solution 1.0065.

(Holty — J. Physic. Chem. 9, 764, '05.)

GALLIC ACID $\text{C}_6\text{H}_2\text{COO}(\text{OH})_3$ 3:4:5.

SOLUBILITY IN SEVERAL SOLVENTS.

(U. S. P.; Bourgoin — Ann. chim. phys. [5] 13, 406, '78.)

| Solvent. | t°. | Gms. $\text{C}_6\text{H}_2\text{O}_6 \cdot \text{H}_2\text{O}$ per 100 Gms. | |
|------------------|-----|---|-----------|
| | | Solvent. | Solution. |
| Water | 25 | 1.20 | 1.18 |
| Water | 100 | 33.3 | 25.0 |
| Alcohol (Abs.) | ... | 23.3 | 18.1 |
| Alcohol (U.S.P.) | 25 | 24.1 | 19.3 |
| Alcohol 90% | ... | 38.8 | 18.9 |
| Ether | 25 | 2.56 | 2.50 |
| Glycerine | 25 | 8.3 | 7.66 |

GERMANIUM DIOXIDE

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GERMANIUM DIOXIDE GeO_2 .

100 gms. H_2O dissolve 0.405 gm. GeO_2 at 20° , and 1.07 gms. at 100° .

(Winkler — J. pr. Chem. [2] 34, 177, '86; 36, 177, '87.)

GERMANIUM (Mono) SULPHIDE GeS and **GERMANIUM (Di) SULPHIDE** GeS_2 .

100 gms. H_2O dissolve 0.24 GeS and 0.45 gm. GeS_2 .

(Winkler.)

GLASS.

For data on the solubility of glass in water and other solvents, see:

(Cowper — J. Chem. Soc. 41, 254, '82; Emmerling — Liebig's Annalen, 150, 257, '60; Böbling — Z. anal. Chem. 23, 518, '84; Kreusler and Herzhold — Ber. 17, 34, '84; Kohlrausch — Ber. 24, 3561, '91; Wied Ann. 44, 577, '91; Förster — Ber. 25, '92; Mylius and Förster — Ber. 22, 1100, '89; Ber. 25, 70, '92; Wartha — Z. anal. Chem. 24, 220, '85, etc.)

GLYCOCHOLIC ACID $\text{CH}_2\text{OH.COOH}$.

SOLUBILITY IN WATER.

(Emich — Monatsh. Chem. 3, 336, '84.)

| Gms. $\text{CH}_2\text{OH(COOH)}$ per 100 gms. H_2O | 20° . | 60° . | 80° . | 100° . |
|--|--------------|--------------|--------------|---------------|
| | 0.033 | 0.102 | 0.235 | 0.850 |

GLUCINIUM SALTS. (See also Beryllium p. 63).

SOLUBILITY IN WATER AND IN ACETIC ACID SOLUTIONS.

(Marignac; Sestini — Gazz. chim. ital. 20, 313, '90.)

| Salt. | Formula. | Solvent. | Gms. Anhydrous Salt per 100 Gms. Solvent. | |
|------------------------------|--|-----------------------------|--|------------------|
| | | | At 20° . | At 100° . |
| Glucinium potassium fluoride | $\text{GlF}_2 \cdot \text{KF}$ | Water | 2.0 | 5.2 |
| “ sodium “ | $\text{GlF}_2 \cdot \text{NaF}$ | “ | 1.4 | 2.8 |
| Glucinium hydroxide | Gl(OH)_2 | Water + CO_2 sat. | 0.0185 (GIO) | ... |
| “ phosphate | $\text{Gl}_3(\text{PO}_4)_2 \cdot 6\text{H}_2\text{O}$ | 2% CH_3COOH | 0.055 | ... |
| “ “ | “ | 10% “ | 0.1725 | ... |

GLUTARIC ACID (Pyrotartaric) $(\text{CH}_2)_3(\text{COOH})_2$.

SOLUBILITY IN WATER.

(Lamoureux — Compt. rend. 128, 998, '99.)

| Gms. $(\text{CH}_2)_3(\text{COOH})_2$ per 100 cc. solution | 0° . | 15° . | 20° . | 35° . | 50° . | 65° . |
|---|-------------|--------------|--------------|--------------|--------------|--------------|
| | 42.9 | 58.7 | 63.9 | 79.7 | 95.7 | 111.8 |

GOLD Au.

SOLUBILITY OF GOLD IN POTASSIUM CYANIDE SOLUTIONS.

(MacLaurin — J. Chem. Soc. 63, 720, '93.)

Gold disks placed in Nestler tubes with KCN solutions.

Grams Au Dissolved in 24 Hours in Nessler Tubes:

| Per cent KCN. | Full. | $\frac{1}{2}$ Full. | Oxygen Passed in. | Oxygen + Agitation. |
|------------------|---------|---------------------|----------------------|------------------------|
| 0.1 | 0.00195 | 0.00331 | ... | ... |
| 1.0 | 0.00162 | 0.00418 | 0.00845 | 0.0187 |
| 5.0 | 0.0032 | 0.0046 | 0.01355 | 0.0472 |
| 20.0 | 0.0012 | 0.00305 | 0.0115 | 0.0314 |
| 50.0 | 0.00043 | 0.00026 | 0.00505 | 0.0108 |

GOLD CHLORIDE (Auric) AuCl_3 .

SOLUBILITY IN WATER, ETC.

100 gms. H_2O dissolve 68 grams AuCl_3 .

AsCl_3 and SbCl_3 each dissolve about 2.5% AuCl_3 at 15° , and 22% at 160° .

SnCl_4 dissolves about 4% AuCl_3 at 160° , and a trace at 0° .

(Lindet — Bull. soc. chim. [2] 45, 149, '86.)

GOLD PHOSPHORUS TRI CHLORIDE (Aurous) $\text{AuCl}_2\text{PCl}_2$.

100 gms. PCl_3 dissolve 1 gram at 15° , and about 12.5 grams at 120° .

(Lindet — Compt. rend. 101, 1492, '85.)

GOLD ALKALI DOUBLE CHLORIDES.

SOLUBILITY OF SODIUM GOLD CHLORIDE, LITHIUM GOLD CHLORIDE, POTASSIUM GOLD CHLORIDE, RHUBIDIUM GOLD CHLORIDE, AND CAESIUM GOLD CHLORIDE IN WATER.

(Rosenblatt — Ber. 19, 2537, '86.)

| t° . | Grams Anhydrous Salt per 100 Grams Solution. | | | | |
|-------------|--|---------------------|--------------------|---------------------|---------------------|
| | NaAuCl_4 . | LiAuCl_4 . | KAuCl_4 . | RbAuCl_4 . | CsAuCl_4 . |
| 10 | 58.2 | 53.1 | 27.7 | 4.6 | 0.5 |
| 20 | 60.2 | 57.7 | 38.2 | 9.0 | 0.8 |
| 30 | 64.0 | 62.5 | 48.7 | 13.4 | 1.7 |
| 40 | 69.4 | 67.3 | 59.2 | 17.7 | 3.2 |
| 50 | 77.5 | 72.0 | 70.0 | 22.2 | 5.4 |
| 60 | 90.0 | 76.4 | 80.2 | 26.6 | 8.2 |
| 70 | ... | 81.0 | ... | 31.0 | 12.0 |
| 80 | ... | 85.7 | ... | 35.3 | 16.3 |
| 90 | ... | ... | ... | 39.7 | 21.7 |
| 100 | ... | ... | ... | 44.2 | 27.5 |

GUAIACOL $\text{C}_8\text{H}_7(\text{OH})\text{OCH}_3$, 1:2. **GUAIACOL CARBONATE** $\text{C}_8\text{H}_7(\text{OCH}_2)_2\text{CO}_2$.SOLUBILITY IN WATER, ALCOHOL, ETC.
(U. S. P.)

| Solvent. | t° . | Gms. per 100 Gms. Solvent. | |
|------------|-------------|----------------------------|---------------------|
| | | Guaiacol. | Guaiacol Carbonate. |
| Water | 25 | 1.89 | ... |
| Alcohol | 25 | ... | 2.08 |
| Chloroform | 25 | ... | 66.6 |
| Ether | 25 | ... | 7.69 |
| Glycerine | 25 | 100 | ... |

a Tri Phenyl GUANIDINE $\text{C}_6\text{H}_5\text{N}:\text{C}(\text{NHC}_6\text{H}_5)_2$.SOLUBILITY IN MIXTURES OF ALCOHOL AND WATER AT 25° .

(Holleman and Antusch — Rec. trav. chim. 13, 292, '94.)

| Vol. % Alcohol. | Gms. $\text{C}_6\text{H}_5\text{N}:\text{C}(\text{NHC}_6\text{H}_5)_2$ per 100 Gms. Solvent. | Density of Solutions. | Vol. % Alcohol. | Gms. $\text{C}_6\text{H}_5\text{N}:\text{C}(\text{NHC}_6\text{H}_5)_2$ per 100 Gms. Solvent. | Density of Solutions. |
|--------------------|---|--------------------------|--------------------|---|--------------------------|
| 100 | 6.23 | 0.8021 | 80 | 1.06 | 0.8572 |
| 95 | 3.75 | 0.8158 | 75 | 0.67 | 0.8704 |
| 90 | 2.38 | 0.8309 | 70 | 0.48 | 0.8828 |
| 85 | 1.58 | 0.8433 | 60 | 0.22 | 0.9048 |

HELIUM

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HELIUM He.

SOLUBILITY IN WATER. (Estreicher — Z. physik. Chem. 31, 184, '99.)

| t°. | Cor. Barometric Pressure. | Vol. of Water. | Vol. of He. | g. | Absorption Coefficient. | |
|-----|---------------------------|----------------|-------------|----------|--|----------------------|
| | | | | | At Bar. Pressure Minus H ₂ O Vapor Tension. | At 760 mm. Pressure. |
| 0 | ... | ... | ... | 0.000270 | ... | 0.0150 |
| 0.5 | 764.0 | 73.584 | 1.093 | ... | 0.0149 | 0.0149 |
| 5 | 758.0 | 73.578 | 1.062 | 0.000260 | 0.0144 | 0.0146 |
| 10 | 758.0 | 73.597 | 1.046 | 0.000255 | 0.0142 | 0.0144 |
| 15 | 757.8 | 73.641 | 1.008 | 0.000246 | 0.0137 | 0.0140 |
| 20 | 758.4 | 73.707 | 0.996 | 0.000242 | 0.0135 | 0.0139 |
| 25 | 762.3 | 73.793 | 0.983 | 0.000238 | 0.0133 | 0.0137 |
| 30 | 764.4 | 73.897 | 0.985 | 0.000238 | 0.0133 | 0.0138 |
| 35 | 764.5 | 74.0167 | 0.972 | 0.000234 | 0.0131 | 0.0138 |
| 40 | 762.0 | 74.147 | 0.957 | 0.000232 | 0.0129 | 0.0139 |
| 45 | 761.7 | 74.294 | 0.947 | 0.000229 | 0.0127 | 0.0140 |
| 50 | 760.9 | 74.461 | 0.920 | 0.000223 | 0.0124 | 0.0140 |

For q and also Absorption Coefficient, see Ethane, page 133.

HEXANE C₆H₁₄.

SOLUBILITY IN METHYL ALCOHOL. (Rothmund — Z. physik. Chem. 26, 475, '98.)

Determined by Synthetic Method, see page 9.

| t°. | Gms. Hexane per 100 Gms. | | t°. | Gms. Hexane per 100 Gms. | |
|-----|--------------------------|---------------|----------------------|--------------------------|---------------|
| | Alcoholic Layer. | Hexane Layer. | | Alcoholic Layer. | Hexane Layer. |
| 10 | 26.5 | 96.8 | 35 | 43.6 | 91.2 |
| 20 | 31.6 | 95.9 | 40 | 52.7 | 85.5 |
| 30 | 38.3 | 93.7 | 42.6 (crit. t.) 68.9 | | |

HIPPURIC ACID C₆H₅CONH.CH₂COOH.

SOLUBILITY IN AQ. POTASSIUM HIPPURATE SOLUTIONS AT 20°. (Hoitsema — Z. physik. Chem. 27, 317, '98.)

| Density of Solutions. | Gram Mols. per Liter Sol. | | Grams per Liter Solution. | | Solid Phase. |
|-----------------------|---|--|---|--|--|
| | C ₆ H ₅ NO ₂ . | KC ₆ H ₅ NO ₂ . | C ₆ H ₅ NO ₂ . | KC ₆ H ₅ NO ₂ . | |
| 1.002 | 0.0182 | 0 | 3.276 | 0.0 | C ₆ H ₅ NO ₂ |
| 1.003 | 0.0163 | 0.011 | 2.919 | 2.39 | " |
| 1.008 | 0.0183 | 0.071 | 3.278 | 15.43 | " |
| 1.022 | 0.0234 | 0.254 | 4.191 | 55.18 | " |
| 1.114 | 0.064 | 1.36 | 11.47 | 295.4 | " |
| 1.182 | 0.131 | 2.21 | 23.46 | 480.1 | " |
| 1.192 | 0.147 | 2.32 | 26.32 | 504.1 | C ₆ H ₅ NO ₂ + KC ₆ H ₅ NO ₂ .H ₂ O |
| 1.195 | 0.153 | 2.40 | 27.40 | 521.4 | |
| 1.201 | 0.133 | 2.50 | 23.82 | 543.1 | C ₆ H ₅ NO ₂ .KC ₆ H ₅ NO ₂ .H ₂ O |
| 1.239 | 0.084 | 3.01 | 15.04 | 654.0 | " |
| 1.282 | 0.068 | 3.57 | 12.18 | 775.7 | C ₆ H ₅ NO ₂ .KC ₆ H ₅ NO ₂ .H ₂ O + KC ₆ H ₅ NO ₂ |
| 1.282 | 0.065 | 3.58 | 11.60 | 777.8 | |
| 1.276 | 0.031 | 3.56 | 5.55 | 773.4 | KC ₆ H ₅ NO ₂ |
| 1.277 | 0.011 | 3.55 | 1.917 | 771.3 | " |
| 1.277 | 0.00 | 3.56 | ... | 773.4 | " |

HOMATROPINE HYDROBROMIDE**HOMATROPINE HYDROBROMIDE** $C_{18}H_{21}NO_3 \cdot HBr$.

SOLUBILITY IN WATER, ETC.

(U. S. P.)

100 grams water dissolve 17.5 grams salt at 25°.
 100 grams alcohol dissolve 3.08 grams salt at 25°, and 11.5 grams at 60°.
 100 grams chloroform dissolve 0.16 gram salt at 25°.

HYDRASTINE $C_{21}H_{21}NO_6$. **HYDRASTINE HYDROCHLORIDE** $C_{21}H_{21}NO_6 \cdot HCl$.

SOLUBILITY IN SEVERAL SOLVENTS.

(U. S. P.; Müller—Apoth.-Ztg. 18, 249, '03.)

| Solvent. | Gms. $C_{21}H_{21}NO_6$ per 100 Gms. Solution. | | Solvent. | Gms. per 100 Gms. Solution at 18°-22°. | |
|-----------------|--|-----------|----------------|--|--------------------------------|
| | At 18°-22°. | At 80°. | | $C_{21}H_{21}NO_6$. | $C_{21}H_{21}NO_6 \cdot HCl$. |
| Water | 0.0033 | 0.025 | Ether | 0.51 | 0.078 (25°) |
| Alcohol | 0.74 (25°) | 5.9 (60°) | Ether + H_2O | 0.80 | ... |
| Benzene | 8.89 | ... | Chloroform | 100+ | 0.35 (25°) |
| Acetic Ether | 4.05 | ... | CCl_4 | 0.123 | ... |
| Petroleum Ether | 0.073 | ... | | | |

HYDRAZINE SULPHATE $N_2H_4 \cdot H_2SO_4$.100 grams water dissolve 3.055 grams $N_2H_4 \cdot H_2SO_4$ at 22°.

(Curtius and Jay — J. pr. Chem. [2] 39, 39, '89.)

HYDROBROMIC ACID HBr .

SOLUBILITY IN WATER.

(Roozeboom — Z. physik. Chem. 2, 454, '88; Rec. trav. chim. 4, 107, '85; 5, 358, '86; see also Pickering — Phil. Mag. [5] 36, 119, '93.)

| t°. | Gms. HBr Dissolved (at 760-765 mm.) per 100 Gms. | | β . | Gms. HBr Dissolved at Lower Pressures per 100 Gms. H_2O . |
|-------|--|-----------|-----------|---|
| | Water. | Solution. | | |
| - 2.5 | 255.0 | 71.83 | ... | 175.0 (10 mm.) |
| - 15 | 239.0 | 70.50 | ... | ... |
| 0 | 221.2 | 68.85 | 611.6 | ... |
| + 10 | 210.3 | 67.76 | 581.4 | 108.5 (5 mm.) |
| 15 | 204.0 | 67.10 | ... | ... |
| 25 | 193.0 | 65.88 | 532.1 | ... |
| 50 | 171.5 | 63.16 | 468.6 | ... |
| 75 | 150.5 | 60.08 | 406.7 | ... |
| 100 | 130.0 | 56.52 | 344.6 | ... |

For β see Ethane, page 133.

HYDROCHLORIC ACID

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HYDROCHLORIC ACID HCl.

SOLUBILITY IN WATER AT DIFFERENT TEMPERATURES AND PRESSURES.

(Deicke; Roscoe and Dittmar — Liebig's Ann. 112, 334, '59; below 0°, Roozeboom — Rec. trav. chim. 3, 104, '84.)

| t°. | At Different Temperatures and 760 mm. Pressure. | | | | At Different Pressures and 0°. | |
|-----|---|----------|-----------------------------|--|--------------------------------|--|
| | cc. HCl per 100 cc. H ₂ O. | Density. | Gms. HCl per 100 g. Sol. | Gms. HCl per 100 g. H ₂ O. | Pressures.* | Gms. HCl per 100 g. H ₂ O. |
| 0 | 525.2 | 1.2257 | 45.15 | 82.31 | 60 | 61.3 |
| 4 | 497.7 | 1.2265 | 44.36 | 79.73 | 100 | 65.7 |
| 8 | 480.3 | 1.2185 | 43.83 | 78.03 | 150 | 68.6 |
| 12 | 471.3 | 1.2148 | 43.28 | 76.30 | 200 | 70.7 |
| 14 | 462.4 | 1.2074 | 42.83 | 74.92 | 300 | 73.8 |
| 18 | 451.2 | 1.2064 | 42.34 | 73.41 | 400 | 76.3 |
| 23 | 435.0 | 1.2014 | 41.54 | 71.03 | 500 | 78.2 |
| 30 | ... | ... | 40.23 | 67.3 | 600 | 80.0 |
| 40 | ... | ... | 38.68 | 63.3 | 750 | 82.4 |
| 50 | ... | ... | 37.34 | 59.6 | 1000 | 85.6 |
| 60 | ... | ... | 35.94 | 56.1 | 1300 | 89.5 |

* Pressures in mm. Hg minus tension of H₂O vapor.

SOLUBILITY IN WATER AT TEMPERATURES BELOW 0°:

At a pressure of 760 mm. At pressures below and above 760 mm.

| t°. | g. | t°. | g. | t°. | mm. Pressure. | g. |
|-------|-------|-----|------|-------|---------------|-------|
| -24 | 101.2 | -15 | 93.3 | -23.8 | ... | 84.2 |
| -21 | 98.3 | -10 | 89.8 | -21 | 334 | 86.8 |
| -18.3 | 96.0 | -5 | 86.8 | -19 | 580 | 92.6 |
| -18 | 95.7 | 0 | 84.2 | -18 | 900 | 98.4 |
| | | | | -17.7 | 1073 | 101.4 |

For value of q, see Ethane, page 133.

SOLUBILITY OF HYDROCHLORIC ACID GAS IN METHYL ALCOHOL, ETHYL ALCOHOL, AND IN ETHER AT 760 MM. PRESSURE.

(de Bruyn — Rec. trav. chim. 12, 129, '92; Schuncke — Z. physik. Chem. 14, 336, '94.)

| t°. | Grams HCl gas per 100 Grams Solution in: | | |
|-----|--|-----------------------------------|--|
| | CH ₃ OH. | C ₂ H ₅ OH. | (C ₂ H ₅) ₂ O. |
| -10 | 54.6 | ... | 37.51 (-9.2°) |
| -5 | ... | ... | 37.0 |
| 0 | 51.3 | 45.4 | 35.6 |
| +5 | ... | 44.2 (6.5°) | 33.1 |
| 10 | ... | 42.7 (11.5°) | 30.35 |
| 15 | ... | ... | 27.62 |
| 20 | 47.0 (18°) | 41.0 | 24.9 |
| 25 | ... | 40.2 (23.5°) | 22.18 |
| 30 | 43.0 (31.7°) | 38.1 (32°) | 19.47 |

HYDROFLUORIC ACID HF.

100 grams H_2O dissolve 111 grams HF at 35° .

(Metzner — *Compt. rend.* 119, 683, '94.)

HYDRIODIC ACID HI. IODIC ACID HIO_3 .

For determinations of the freezing points of aqueous solutions of HI, and isolation of the several hydrates at temperatures below 0° , see Pickering — *Ber.* 26, 2307, '93.

SOLUBILITY OF IODIC ACID AND ITS MODIFICATIONS IN WATER.

(Groschuff — *Z. anorg. Chem.* 47, 343, '05.)

| t° . | Grams per 100 Gms. Solution. | | Gram Mols. I_2O_5 per 100 Gm. Mols. | | Solid Phase. |
|-------------|------------------------------|------------|---------------------------------------|-----------|--------------------------------------|
| | HIO_3 . | I_2O_5 . | H_2O . | Solution. | |
| -14 | 72.8 | 69.1 | 12.1 | 10.8 | Ice + HIO_3 , HIO_3 . |
| 0 | 74.1 | 70.3 | 12.8 | 11.3 | |
| 16 | 75.1 | 71.7 | 13.7 | 12.0 | " |
| 40 | 77.7 | 73.7 | 15.1 | 13.2 | " |
| 60 | 80.0 | 75.9 | 17.0 | 14.5 | " |
| 80 | 82.5 | 78.3 | 19.4 | 16.3 | " |
| 85 | 83.0 | 78.7 | 20.0 | 16.7 | " |
| 101 | 85.2 | 80.8 | 22.8 | 18.6 | " |
| 110 | 86.5 | 82.1 | 24.7 | 19.8 | HIO_3 + HI_2O_3 , HI_2O_3 . |
| 125 | 87.2 | 82.7 | 25.9 | 20.6 | |
| 140 | 88.3 | 83.8 | 27.9 | 21.8 | " |
| 160 | 90.5 | 85.9 | 32.8 | 24.7 | " |

SOLUBILITY OF IODIC ACID IN NITRIC ACID.

(Groschuff.)

| t° . | Grams HIO_3 per 100 Grams. | | |
|-------------|------------------------------|--------------------------|--------------------------|
| | Aq. Solution. | 27.73% HNO_3 Solution. | 40.88% HNO_3 Solution. |
| 0 | 74.1 | 18.0 | 9.0 |
| 20 | 75.8 | 21.0 | 10.0 |
| 40 | 77.7 | 27.0 | 14.0 |
| 60 | 80.0 | 38.0 | 18.0 |

HYDROGEN H.**SOLUBILITY IN WATER.**

(Winkler — *Ber.* 24, 99, '91; Bohr and Bock — *Wied. Ann.* 44, 318, '91; Timofejew — *Z. physik. Chem.* 6, 147, '90.)

| t° . | β' . | l . | | β . | q . |
|-------------|------------|--------|----------|-----------|----------|
| 0 | 0.0214 | ... | ... | 0.0214 | 0.000193 |
| 5 | 0.0203 | 0.0209 | — 0.0241 | 0.0204 | 0.000184 |
| 10 | 0.0193 | 0.0204 | — 0.0229 | 0.0195 | 0.000176 |
| 15 | 0.0185 | 0.0200 | — 0.0217 | 0.0188 | 0.000169 |
| 20 | 0.0178 | 0.0196 | — 0.0205 | 0.0182 | 0.000162 |
| 25 | 0.0171 | 0.0193 | — 0.0191 | 0.0175 | 0.000156 |
| 30 | 0.0163 | ... | ... | 0.0170 | 0.000147 |
| 40 | 0.0153 | ... | ... | 0.0164 | 0.000139 |
| 50 | 0.0141 | ... | ... | 0.0161 | 0.000129 |
| 60 | 0.0129 | ... | ... | 0.0160 | 0.000119 |
| 80 | 0.0085 | ... | ... | 0.0160 | 0.000079 |
| 100 | 0.0000 | ... | ... | 0.0160 | 0.000000 |

l = Ostwald Solubility Expression, see page 105. For β' , β , and q , see Ethane, page 133.

SOLUBILITY OF HYDROGEN IN AQUEOUS SOLUTIONS OF ACIDS AND BASES AT 25°.

(Geffcken — Z. physik. Chem. 49, 268, '04.)

| Gram Equiv. Acids and Bases per Liter. | Solubility of H (l_{25} = Ostwald Expression) in Solutions of: | | | | | | |
|---|---|--------------------|--|-----------------------|-------------------------|--------|--------|
| | HCl. | HNO ₃ . | $\frac{1}{2}$ H ₂ SO ₄ . | CH ₃ COOH. | CH ₃ ClCOOH. | KOH. | NaOH. |
| 0.0 | 0.0193 | 0.0193 | 0.0193 | 0.0193 | 0.0193 | 0.0193 | 0.0193 |
| 0.5 | 0.0186 | 0.0188 | 0.0185 | 0.0192 | 0.0189 | 0.0167 | 0.0165 |
| 1.0 | 0.0179 | 0.0183 | 0.0177 | 0.0191 | 0.0186 | 0.0142 | 0.0139 |
| 2.0 | 0.0168 | 0.0174 | 0.0163 | 0.0188 | 0.0180 | ... | 0.0097 |
| 3.0 | 0.0159 | 0.0167 | 0.0150 | 0.0186 | ... | ... | 0.0072 |
| 4.0 | ... | 0.0160 | 0.0141 | 0.0186 | ... | ... | 0.0055 |

The above figures for the concentrations of acids and bases were calculated to grams per liter, and these values with the corresponding l_{25} values for the solubility of hydrogen plotted on cross-section paper. From the resulting curves the following table was read.

| Grams Acids and Bases per Liter. | Solubility of H (l_{25} = Ostwald Expression) in Solutions of: | | | | | | |
|--|---|--------------------|--|-----------------------|-------------------------|--------|--------|
| | HCl. | HNO ₃ . | $\frac{1}{2}$ H ₂ SO ₄ . | CH ₃ COOH. | CH ₃ ClCOOH. | KOH. | NaOH. |
| 0 | 0.0193 | 0.0193 | 0.0193 | 0.0193 | 0.0193 | 0.0193 | 0.0193 |
| 20 | 0.0185 | 0.0189 | 0.0186 | 0.0192 | 0.0191 | 0.0172 | 0.0165 |
| 40 | 0.0179 | 0.0186 | 0.0180 | 0.0191 | 0.0190 | 0.0153 | 0.0140 |
| 60 | 0.0173 | 0.0183 | 0.0174 | 0.0190 | 0.0188 | 0.0135 | 0.0117 |
| 80 | 0.0167 | 0.0180 | 0.0168 | 0.0189 | 0.0187 | ... | 0.0097 |
| 100 | 0.0160 | 0.0179 | 0.0162 | 0.0189 | 0.0185 | ... | 0.0082 |
| 150 | ... | 0.0171 | 0.0148 | 0.0188 | 0.0182 | ... | 0.0058 |
| 200 | ... | 0.0165 | 0.0140 | 0.0186 | 0.0179 | ... | ... |
| 250 | ... | 0.0160 | ... | 0.0184 | ... | ... | ... |

For Ostwald Solubility Expression, see page 105.

SOLUBILITY OF HYDROGEN IN AQUEOUS SOLUTIONS OF AMMONIUM NITRATE AT 20°.

(Knopp — Z. physik. Chem. 43, 103, '04.)

| ρ . | Normality (per 1000 Gms.) H ₂ O. | Molecular Concentra- tion. | Absorption Coefficient of Hydrogen. | Density of Solutions. |
|----------|---|----------------------------------|---|--------------------------|
| 0.00 | 0.00 | 0.00 | 0.0188 | ... |
| 1.037 | 0.1308 | 0.002352 | 0.01872 | 1.0027 |
| 2.167 | 0.2765 | 0.004956 | 0.01845 | 1.0072 |
| 3.378 | 0.4363 | 0.007799 | 0.01823 | 1.0122 |
| 4.823 | 0.6333 | 0.011280 | 0.01773 | 1.0182 |
| 6.773 | 0.9069 | 0.016447 | 0.01744 | 1.0262 |
| 11.550 | 1.6308 | 0.028525 | 0.01647 | 1.04652 |

SOLUBILITY OF HYDROGEN IN AQUEOUS SOLUTIONS OF BARIUM CHLORIDE.

(Braun — Z. physik. Chem. 33, 735, '00.)

| Gms. BaCl ₂ per 100 Gms. Solution. | Coefficient of Absorption of Hydrogen at : | | | | |
|---|--|--------|--------|--------|--------|
| | 5°. | 10°. | 15°. | 20°. | 25°. |
| 0.00 | 0.0237 | 0.0221 | 0.0206 | 0.0191 | 0.0175 |
| 3.29 | 0.0211 | 0.0198 | 0.0185 | 0.0172 | 0.0157 |
| 3.6 | 0.0209 | 0.0197 | 0.0184 | 0.0170 | 0.0156 |
| 6.45 | 0.0196 | 0.0186 | 0.0173 | 0.0161 | 0.0147 |
| 7.00 | 0.0194 | 0.0183 | 0.0172 | 0.0159 | 0.0146 |

SOLUBILITY OF HYDROGEN IN AQUEOUS SOLUTIONS OF CALCIUM CHLORIDE, MAGNESIUM SULPHATE, AND LITHIUM CHLORIDE AT 15°.

(Gordon — Z. physik. Chem. 18, 14, '95.)

Coefficient of Absorption of hydrogen in water at 15° = 0.01883.

| In Calcium Chloride. | | | In Magnesium Sulphate. | | | In Lithium Chloride. | | |
|--|---|------------------------------------|--|---|------------------------------------|---------------------------------|--------------------------------|------------------------------------|
| Gms. CaCl ₂ per 100 g. Sol. | G. M. CaCl ₂ per Liter. | Absorption Coefficient of H. | Gms. MgSO ₄ per 100 g. Sol. | G. M. MgSO ₄ per Liter. | Absorption Coefficient of H. | Gms. LiCl per 100 g. Sol. | G. M. LiCl per Liter. | Absorption Coefficient of H. |
| 3.47 | 0.321 | 0.01619 | 4.97 | 0.433 | 0.01501 | 3.48 | 0.835 | 0.01619 |
| 6.10 | 0.578 | 0.01450 | 10.19 | 0.936 | 0.01159 | 7.34 | 1.800 | 0.01370 |
| 11.33 | 1.122 | 0.01138 | 23.76 | 2.501 | 0.00499 | 14.63 | 3.734 | 0.0099 |
| 17.52 | 1.1827 | 0.00839 | | | | | | |
| 26.34 | 2.962 | 0.00519 | | | | | | |

For definition of Coefficient of Absorption, see page 105.

SOLUBILITY OF HYDROGEN IN AQUEOUS SOLUTIONS OF POTASSIUM CARBONATE, CHLORIDE, AND NITRATE AT 15°.

(Gordon.)

| In Potassium Carbonate. | | | In Potassium Chloride. | | | In Potassium Nitrate. | | |
|---|--|------------------------------------|--------------------------------|-------------------------------|------------------------------------|---|--|------------------------------------|
| Gms. K ₂ CO ₃ per 100 g. Sol. | G. M. K ₂ CO ₃ per Liter. | Absorption Coefficient of H. | Gms. KCl per 100 g. Sol. | G. M. KCl per Liter. | Absorption Coefficient of H. | Gms. KNO ₃ per 100 g. Sol. | G. M. KNO ₃ per Liter. | Absorption Coefficient of H. |
| 2.82 | 0.209 | 0.01628 | 3.83 | 0.526 | 0.01667 | 4.73 | 0.482 | 0.01683 |
| 8.83 | 0.690 | 0.01183 | 7.48 | 1.051 | 0.01489 | 8.44 | 0.879 | 0.01559 |
| 16.47 | 1.376 | 0.00761 | 12.13 | 1.755 | 0.01279 | 16.59 | 1.820 | 0.01311 |
| 24.13 | 2.156 | 0.00462 | 19.21 | 2.909 | 0.01012 | 21.46 | 2.430 | 0.01180 |
| 41.81 | 4.352 | 0.00160 | 22.92 | 3.554 | 0.00892 | | | |

SOLUBILITY OF HYDROGEN IN AQUEOUS SOLUTIONS OF POTASSIUM CHLORIDE AND NITRATE AT 20°.

(Knopp — Z. physik. Chem. 43, 103, '04.)

| In Potassium Chloride. | | | | In Potassium Nitrate. | | | |
|------------------------|---|----------------------------|-----------------------------|-----------------------|---|----------------------------|-----------------------------|
| g. | Normality (per 1000 g. H ₂ O). | Absorption Coefficient. | Density of Solutions. | g. | Normality (per 1000 g. H ₂ O). | Absorption Coefficient. | Density of Solutions. |
| 1.089 | 0.1475 | 0.01823 | 1.0052 | 1.224 | 0.1245 | 0.01835 | 1.0059 |
| 2.123 | 0.2907 | 0.01757 | 1.0118 | 2.094 | 0.2114 | 0.01818 | 1.0113 |
| 4.070 | 0.5687 | 0.01661 | 1.0243 | 4.010 | 0.4127 | 0.01785 | 1.0236 |
| 6.375 | 0.9127 | 0.01531 | 1.0394 | 5.925 | 0.6225 | 0.01743 | 1.0359 |
| 7.380 | 1.0682 | 0.01472 | 1.0460 | 7.742 | 0.8293 | 0.01667 | 1.0477 |
| 13.612 | 2.1222 | 0.01255 | 1.0875 | 13.510 | 1.5436 | 0.01436 | 1.0865 |

SOLUBILITY OF HYDROGEN IN AQUEOUS SODIUM CARBONATE AND SULPHATE SOLUTIONS AT 15°.

(Gordon.)

| In Sodium Carbonate. | | | In Sodium Sulphate. | | |
|---|--|------------------------------|---|--|------------------------------|
| Gms. Na ₂ CO ₃ per 100 Gms. Solution. | G. M. Na ₂ CO ₃ per Liter. | Absorption Coefficient of H. | Gms. Na ₂ SO ₄ per 100 Gms. Solution. | G. M. Na ₂ SO ₄ per Liter. | Absorption Coefficient of H. |
| 2.15 | 0.207 | 0.01639 | 4.58 | 0.335 | 0.01519 |
| 8.64 | 0.438 | 0.01385 | 8.42 | 0.638 | 0.0154 |
| 11.53 | 1.218 | 0.00839 | 16.69 | 1.364 | 0.00775 |

SOLUBILITY OF HYDROGEN IN AQUEOUS SOLUTIONS OF SODIUM CHLORIDE.

(Braun; Gordon.)

| Gms. NaCl per 100 Gms. Solution. | Coefficient of Absorption of Hydrogen at: | | | | |
|----------------------------------|---|--------|---------|--------|--------|
| | 5°. | 10°. | 15°. | 20°. | 25°. |
| 1.25 | 0.0218 | 0.0205 | 0.0191 | 0.0177 | 0.0162 |
| 3.80 | 0.0198 | 0.0188 | 0.0176 | 0.0162 | 0.0148 |
| 4.48 | 0.0192 | 0.0182 | 0.0171 | 0.0159 | 0.0143 |
| 6.00 | 0.0184 | 0.0175 | 0.0164 | 0.0153 | 0.0138 |
| 14.78 | ... | ... | 0.0093 | ... | ... |
| 23.84 | ... | ... | 0.00595 | ... | ... |

SOLUBILITY OF HYDROGEN IN AQUEOUS SOLUTIONS OF SODIUM NITRATE.

In Sodium Nitrate at 20°.

(Knopp.)

In Sodium Nitrate at 15°.

(Gordon.)

| p. | Normality (per 1000 Gms. H ₂ O). | Absorption Coefficient of H. | Density of Solutions. | Gms. NaNO ₃ per 100 Gms. Solution. | G. M. NaNO ₃ per Liter. | Absorption Coefficient of H. |
|--------|---|------------------------------|-----------------------|---|------------------------------------|------------------------------|
| 1.041 | 0.1236 | 0.01839 | 1.0052 | 5.57 | 0.679 | 0.01603 |
| 2.192 | 0.2634 | 0.01774 | 1.0130 | 11.16 | 1.413 | 0.0137 |
| 4.405 | 0.5416 | 0.01694 | 1.0282 | 19.77 | 2.656 | 0.01052 |
| 6.702 | 0.8442 | 0.01518 | 1.04411 | 37.43 | 5.711 | 0.00578 |
| 12.637 | 1.7354 | 0.0130 | 1.08667 | | | |

SOLUBILITY OF HYDROGEN IN ALCOHOL.

(Timofejew — Z. physik. Chem. 6, 147, '90.)

| t°. | Coefficient of Abs. in 98.8% Alcohol. | t°. | Coefficient of Abs. in 99.7% Alcohol. |
|------|---------------------------------------|------|---------------------------------------|
| 0 | 0.0676 | 4 | 0.0749 |
| 6.2 | 0.0693 | 18.8 | 0.0740 |
| 13.4 | 0.0705 | | |
| 18.8 | 0.0740 | | |

SOLUBILITY IN AQUEOUS ALCOHOL SOLUTIONS AT 20° AND 760 MM. PRESSURE.

(Lubarsch — Wied. Ann. [2] 37, 525, '89.)

| Wt. % Alcohol. | Vol. % Absorbed H. | Wt. % Alcohol. | Vol. % Absorbed H. |
|----------------|--------------------|----------------|--------------------|
| 0.00 | 1.93 | 28.57 | 1.04 |
| 9.09 | 1.43 | 33.33 | 1.17 |
| 16.67 | 1.29 | 50.0 | 2.02 |
| 23.08 | 1.17 | 66.67 | 2.55 |

SOLUBILITY OF HYDROGEN IN AQUEOUS SUGAR SOLUTIONS AT 15°.

(Gordon — Z. physik. Chem. 18, 14, '95.)

| Gms. Sugar per 100 Gms. Solution. | Gm. Mols. Sugar per Liter. | Absorption Coefficient of H. |
|--------------------------------------|-------------------------------|---------------------------------|
| 16.67 | 0.520 | 0.01561 |
| 30.08 | 0.993 | 0.01284 |
| 47.65 | 1.699 | 0.00892 |

SOLUBILITY OF HYDROGEN IN WATER AND IN ORGANIC SOLVENTS.

Results in terms of the Ostwald Expression, see page 105.

(Just — Z. physik. Chem. 37, 359, '01.)

| Solvent. | l_{25} . | l_{20} . | Solvent. | l_{25} . | l_{20} . |
|-------------------|------------|------------|-----------------------|------------|------------|
| Water | 0.0199 | 0.0200 | Amyl Acetate | 0.0774 | 0.0743 |
| Anilin | 0.0285 | 0.0303 | Xylene | 0.0819 | 0.0783 |
| Amyl Alcohol | 0.0301 | 0.0353 | Ethyl Acetate | 0.0852 | 0.0788 |
| Nitro Benzene | 0.0371 | 0.0353 | Toluene | 0.0874 | 0.0838 |
| Carbon Disulphide | 0.0375 | 0.0336 | Ethyl Alcohol (98.8%) | 0.0894 | 0.0862 |
| Acetic Acid | 0.0633 | 0.0617 | Methyl Alcohol | 0.0945 | 0.0902 |
| Benzene | 0.0756 | 0.0707 | Iso Butyl Alcohol | 0.0976 | 0.0929 |
| Acetone | 0.0764 | 0.0703 | | | |

SOLUBILITY OF HYDROGEN IN CHLORAL HYDRATE SOLUTIONS

AT 20°.

(Knopp.)

| ρ . | Normality (per 1000 Gms. H ₂ O). | Molecular Concentration. | Absorption Coefficient of H. | Density of Solutions. |
|----------|--|-----------------------------|---------------------------------|--------------------------|
| 4.91 | 0.310 | 0.005594 | 0.01839 | 1.0202 |
| 7.69 | 0.504 | 0.008992 | 0.01802 | 1.0320 |
| 14.56 | 1.030 | 0.018223 | 0.01712 | 1.0669 |
| 29.50 | 2.530 | 0.043601 | 0.01542 | 1.1466 |
| 38.42 | 3.770 | 0.063647 | 0.01440 | 1.1982 |
| 49.79 | 6.000 | 0.097493 | 0.01353 | 1.2724 |
| 63.90 | 10.700 | 0.161660 | 0.01307 | 1.3743 |

SOLUBILITY OF HYDROGEN IN PROPIONIC ACID SOLUTIONS.

(Braun.)

| G. C ₂ H ₅ COOH per 100 Gms. Solution. | Coefficient of Absorption of Hydrogen at: | | | | |
|--|---|--------|--------|--------|--------|
| | 5°. | 10°. | 15°. | 20°. | 25°. |
| 2.63 | 0.02245 | 0.0214 | 0.0200 | 0.0188 | 0.0172 |
| 3.37 | 0.0222 | 0.0212 | 0.0199 | 0.0187 | 0.0171 |
| 5.27 | 0.0224 | 0.0212 | 0.0198 | 0.0184 | 0.0171 |
| 6.50 | 0.0218 | 0.0209 | 0.0193 | 0.0183 | 0.0169 |
| 9.91 | 0.0213 | 0.0203 | 0.0191 | 0.0178 | 0.0160 |

SOLUBILITY OF HYDROGEN IN PETROLEUM.

(Griewasz and Walfisz — Z. physik. Chem. 1, 70, '87.)

Coefficient of absorption at 20° = 0.0582, at 10° = 0.0652.

HYDROGEN SULPHIDE H_2S .SOLUBILITY IN WATER AND IN ALCOHOL AT t° AND 760 MM. PRESSURE.

(Bunsen and Carius; Fauser — Math. u Natur. W. Ber. (Ungarn.) 6, 154, '88.)

| In Water. | | | | In Alcohol. | |
|-------------|--|-----------|-------|---|--|
| t° . | 1 Vol. H_2O Absorbs | β . | q . | 1 Vol. Alcohol Absorbs | |
| 0 | 4.37 Vols. H_2S (at 0° and 760 mm.) | 4.686 | 0.710 | 17.89 Vols. H_2S (at 0° and 760 mm.) | |
| 5 | 3.97 " | 4.063 | 0.615 | 14.78 " | |
| 10 | 3.59 " | 3.520 | 0.530 | 11.99 " | |
| 15 | 3.23 " | 3.056 | 0.458 | 9.54 " | |
| 20 | 2.91 " | 2.672 | 0.398 | 7.42 " | |
| 25 | 2.61 " | ... | ... | 5.96 (24°) | |
| 30 | 2.33 " | ... | ... | ... | |
| 35 | 2.08 " | ... | ... | ... | |
| 40 | 1.86 " | ... | ... | ... | |

For β and q see Ethane, page 133.SOLUBILITY OF HYDROGEN SULPHIDE IN AQUEOUS SALT SOLUTIONS
AT 25° .

(McLauchlan — Z. physik. Chem. 44 615, '03.)

NOTE. — The original results are given in terms of $\frac{l}{l_0}$ which is the iodine titer (l) of the H_2S dissolved in the salt solution divided by the titer (l_0) of the H_2S dissolved in pure water. These figures were multiplied by 2.61 (see 25° results in preceding table) and the products recorded in the following table as volumes of H_2S absorbed by 1 vol. of aqueous solution.

| Solution. | Grams Salt per Liter. | $\frac{l}{l_0}$. | Vols. H_2S per 1 Vol. Sol. | Solution. | Gms. Salt per Liter. | $\frac{l}{l_0}$. | Vols. H_2S per 1 Vol. Sol. |
|--------------------------------|-----------------------|-------------------|------------------------------|----------------------------|----------------------|-------------------|------------------------------|
| n NH_4Br | 98.0 | 1.00 | 2.61 | n KBr | 119.0 | 0.945 | 2.47 |
| n NH_4Cl | 53.4 | 0.96 | 2.40 | n KCl | 74.5 | 0.853 | 2.22 |
| n NH_4NO_3 | 80.0 | 0.99 | 2.58 | n KNO_3 | 101.0 | 0.913 | 2.38 |
| $\frac{1}{2}$ n $(NH_4)_2SO_4$ | 33.0 | 0.82 | 2.14 | $\frac{1}{2}$ n K_2SO_4 | 43.5 | 0.78 | 2.04 |
| $\frac{1}{2}$ n $(NH_4)_2CO_3$ | 16.5 | 0.91 | 2.37 | $\frac{1}{2}$ n K_2CO_3 | 21.7 | 0.89 | 2.32 |
| n $NH_4C_2H_3O_2$ | 77.1 | 1.09 | 2.84 | n KI | 166.0 | 0.98 | 2.56 |
| n $(NH_4)_2CO$ | 60.1 | 1.02 | 2.66 | n $NaBr$ | 103.0 | 0.935 | 2.44 |
| $\frac{1}{2}$ n HCl | 18.22 | 0.975 | 2.54 | n $NaCl$ | 58.5 | 0.847 | 2.21 |
| $\frac{1}{2}$ n H_2SO_4 | 24.52 | 0.905 | 2.36 | $\frac{1}{2}$ n $NaCl$ | 29.2 | 0.93 | 2.42 |
| n $C_6H_5O_4$ | 150.0 | 0.944 | 2.46 | n $NaNO_3$ | 85.0 | 0.893 | 2.32 |
| $\frac{3}{4}$ n $C_6H_5O_4$ | 450.0 | 0.858 | 2.24 | $\frac{1}{2}$ n Na_2SO_4 | 35.5 | 0.73 | 1.90 |
| Pure $C_6H_5(OH)_2$ | 1000.0 | 0.863 | 2.26 | $\frac{1}{2}$ n Na_2SO_4 | 17.8 | 0.89 | 2.32 |

HYDROQUINONE $C_6H_4(OH)_2$, 1:4, also Resorcin $C_6H_4(OH)_2$, 1:3 and Pyrocatechin $C_6H_4(OH)_2$, 1:2.

SOLUBILITY IN WATER.

(Vaubel — J. pr. Chem. [2] 59, 30, '99.)

100 grams solution contain 6.7 grams hydroquinone at 20° . Sp. Gr. of sol. = 1.012.

100 grams solution contain 63.7 grams resorcin at 20° .

100 grams solution contain 31.1 grams pyrocatechin at 20° .

SOLUBILITY OF HYDROQUINONE IN SULPHUR DIOXIDE IN THE CRITICAL VICINITY.

(Centnerswer and Teletow — Z. Electrochem. 9, 799, '03.)

Determinations made by the Synthetic Method, for which see Note, page 9.

| t°. | Gms. Hydroquinone per 100 Gms. Sol. | t°. | Gms. Hydroquinone per 100 Gms. Sol. | t°. | Gms. Hydroquinone per 100 Gms. Solution. |
|------|--|-------|--|-------|---|
| 63 | 0.89 | 117.6 | 4.46 | 136.7 | 10.31 |
| 73.5 | 1.22 | 123.3 | 5.66 | 141.4 | 13.3 |
| 89.2 | 2.18 | 134.2 | 8.31 | 145.0 | 14.9 |

HYDROXYLAMINE $\text{NH}_2(\text{OH})$. HYDROXYLAMINE HYDROCHLORIDE $\text{NH}_2(\text{OH})\cdot\text{HCl}$.

SOLUBILITY IN SEVERAL SOLVENTS.

(de Bruyn — Rec. trav. chim. 11, 18, '92; Z. physik. Chem. 10, 783, '92.)

| Solvent. | t°. | Grams NH_2OH per 100 Gms. Solution. | t°. | Grams $\text{NH}_2(\text{OH})\cdot\text{HCl}$ per 100 Gms. Solution. |
|-----------------------|----------|---|-------|--|
| Methyl Alcohol (abs.) | 5° | 35.0 | 19.75 | 16.4 |
| Ethyl Alcohol (abs.) | 15° | 15.0 | 19.75 | 4.43 |
| Ether (dry) | (b. pt.) | 1.2 | ... | ... |
| Ethyl Acetate | (b. pt.) | 1.6 | ... | ... |

For densities of $\text{NH}_2(\text{OH})\cdot\text{HCl}$ solutions, see Schiff and Monsacchi — Z. physik. Ch. 21, 277, '96.

HYOSCYAMINE $\text{C}_{17}\text{H}_{21}\text{NO}_3$.

SOLUBILITY IN SEVERAL SOLVENTS AT 18°–22°.

(Müller — Apoth.-Ztg. 18, 249, '03.)

| Solvent. | Gms. $\text{C}_{17}\text{H}_{21}\text{NO}_3$ per 100 Gms. Solution. | Solvent. | Gms. $\text{C}_{17}\text{H}_{21}\text{NO}_3$ per 100 Gms. Solution. |
|--------------------------------------|---|-----------------------|---|
| Water | 0.355 | Chloroform | 100+ |
| Ether | 2.02 | Acetic Ether | 4.903 |
| Ether sat. with H_2O | 3.913 | Petroleum Ether | 0.098 |
| Water sat. with Ether | 3.125 | Carbon Tetra Chloride | 0.059 |
| Benzene | 0.769 | | |

HYOSCINE HYDROBROMIDE, etc.

SOLUBILITY IN SEVERAL SOLVENTS AT 25°.

(U. S. P.)

| Solvent. | Grams per 100 Grams Solvent. | | |
|------------|--|---|--|
| | Hyosine Hydrobromide $\text{C}_{17}\text{H}_{21}\text{NO}_3\cdot\text{HBr}\cdot 3\text{H}_2\text{O}$. | Hyoscyamine Hydrobromide $\text{C}_{17}\text{H}_{21}\text{NO}_3\cdot\text{HBr}$. | Hyoscyamine Sulphate $(\text{C}_{17}\text{H}_{21}\text{NO}_3)_2\cdot\text{H}_2\text{SO}_4$. |
| Water | 66.6 | very soluble | very soluble |
| Alcohol | 6.2 | 50 | 15.6 |
| Ether | ... | 0.062 | 0.04 |
| Chloroform | 0.133 | 40.0 | 0.043 |

IODINE

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IODINE I.

SOLUBILITY IN WATER.

| t°. | Gms. I per Liter Solution. | Authority. |
|-----|----------------------------|--|
| 15 | 0.272-0.283 | (Dietz — Pharm. Ztg. 43, 290, '98.) |
| 25 | 0.279 | (McLauchlan — Z. physik. Chem. 44, 617, '03.) |
| 25 | 0.304 | (Herz and Knoch — Z. anorg. Chem. 45, 269, '05.) |
| 25 | 0.339 | (Jakowkin — Z. physik. Chem. 18, 590, '95.) |
| 25 | 0.340 | (Noyes and Seidensticker — Z. physik. Chem. 27, 359, '98.) |
| 30 | 0.457 | (Dietz.) |

SOLUBILITY OF IODINE IN AQUEOUS POTASSIUM IODIDE SOLUTIONS AT 25°.

(Noyes and Seidensticker; Bruner — Z. physik. Chem. 26, 147, '98.)

| Millimols per Liter. | | Gms. per Liter. | | Results by Bruner. | |
|----------------------|--------------------|-----------------|-------|--------------------------|-------------------|
| KI. | (I ₂). | KI. | I. | Gms. KI per 1000 g. Sol. | Gms. I per Liter. |
| 0.000 | 1.342 | 0.00 | 0.340 | 10 | 0.78* |
| 0.830 | 1.814 | 1.37 | 0.461 | 20 | 1.60 |
| 1.661 | 2.235 | 2.75 | 0.568 | 40 | 3.25 |
| 3.322 | 3.052 | 5.51 | 0.775 | 60 | 5.04 |
| 6.643 | 4.667 | 11.03 | 1.185 | 80 | 6.94 |
| 13.29 | 8.003 | 22.07 | 2.032 | 100 | 8.96 |
| 26.57 | 14.68 | 44.15 | 3.728 | | |
| 53.15 | 28.03 | 88.3 | 7.119 | | |
| 106.3 | 55.28 | 176.6 | 14.04 | | |

* There is some uncertainty in regard to the position of the decimal point in this column. By calculation from the original it should be one place further to the right.

SOLUBILITY OF IODINE IN AQUEOUS SALT SOLUTIONS AT 25°.

(McLauchlan.)

| Salt. | Gms. Salt per Liter. | Gms. Dissolved I per Liter. | Salt. | Gms. Salt per Liter. | Gms. Dissolved I per Liter. |
|---|----------------------|-----------------------------|---|----------------------|-----------------------------|
| Na ₂ SO ₄ | 29.77 | 0.160 | NH ₄ Cl | 53.4 | 0.735 |
| K ₂ SO ₄ | 43.5 | 0.238 | NaBr | 103.0 | 3.29 |
| (NH ₄) ₂ SO ₄ | 33.0 | 0.246 | KBr | 119.0 | 3.801 |
| NaNO ₃ | 85.0 | 0.257 | NH ₄ Br | 98.0 | 4.003 |
| KNO ₃ | 101.2 | 0.266 | NH ₄ C ₂ H ₃ O ₂ | 77.1 | 0.440 |
| NH ₄ NO ₃ | 80.0 | 0.375 | (NH ₄) ₂ C ₂ H ₄ | 86.9 | 0.980 |
| NaCl | 58.5 | 0.575 | H ₃ BO ₃ | 55.8 | 0.300 |
| KCl | 73.6 | 0.658 | | | |

SOLUBILITY OF IODINE IN ARSENIC TRI CHLORIDE.

(Sloan and Mallet — Chem. News, 46, 194, '82.)

| t°. | 0°. | 15°. | 96°. |
|---------------------------------------|------|-------|-------|
| Gms. I per 100 gms. AsCl ₃ | 8.42 | 11.88 | 36.89 |

SOLUBILITY OF IODINE IN AQUEOUS ETHYL AND NORMAL PROPYL ALCOHOL SOLUTIONS AT 15°.

(Bruner — Z. physik. Chem. 26, 147, '98.)

| In Aq. Ethyl Alcohol. | | | | In Aq. Propyl Alcohol. | | | |
|---|------------------------------|---|-------------------------|---|-------------------------|---|-------------------------|
| Gms. C ₂ H ₅ OH per 100 Gms. Solvent. | Gms. I per 100 cc. Solution. | Gms. C ₂ H ₅ OH per 100 Gms. Solvent. | Gms. I per 100 cc. Sol. | Gms. C ₃ H ₇ OH per 100 Gms. Solvent. | Gms. I per 100 cc. Sol. | Gms. C ₃ H ₇ OH per 100 Gms. Solvent. | Gms. I per 100 cc. Sol. |
| 10 | 0.05 | 60 | 1.14 | 10 | 0.05 | 60 | 2.71 |
| 20 | 0.06 | 70 | 2.33 | 20 | 0.11 | 70 | 4.10 |
| 30 | 0.10 | 80 | 4.20 | 30 | 0.40 | 80 | 6.05 |
| 40 | 0.26 | 90 | 7.47 | 40 | 0.94 | 90 | 9.17 |
| 50 | 0.88 | 100 | 15.67 | 50 | 1.64 | 100 | 14.93 |

SOLUBILITY OF IODINE IN BENZENE, CHLOROFORM, AND IN ETHER.

(Arctowski — Z. anorg. Chem. 11, 276, '95-'96.)

| In Benzene. | | In Chloroform. | | In Ether. | |
|-------------|-------------------------------|----------------|-------------------------------------|-----------|-------------------------------|
| t°. | Gms. I per 100 Gms. Solution. | t°. | Gms. I per 100 Gms. Solution. | t°. | Gms. I per 100 Gms. Solution. |
| 4.7 | 8.08 | -49 | 0.188 | -83 | 15.39 |
| 6.6 | 8.63 | -55½ | 0.144 | -90 | 14.58 |
| 10.5 | 9.60 | -60 | 0.129 | -108 | 15.09 |
| 13.7 | 10.44 | -69½ | 0.089 | | |
| 16.3 | 11.23 | -73½ | 0.080 | | |
| | | +10 | 1.76 per 100 gms. CHCl ₃ | | |

(Duncan — Pharm. J. Trans. 22, 544, '91-'92.)

SOLUBILITY OF IODINE IN BROMOFORM, CARBON TETRA CHLORIDE, AND IN CARBON BISULPHIDE AT 25°.

(Jakowkin — Z. physik. Chem. 18, 590, '95.)

- 1 liter of saturated solution in CHBr₃ contains 189.55 gms. I.
- 1 liter of saturated solution in CCl₄ contains 30.33 gms. I.
- 1 liter of saturated solution in CS₂ contains 230.0 gms. I.

SOLUBILITY OF IODINE IN CARBON BISULPHIDE SOLUTIONS.

(Arctowski — Z. anorg. Chem. 6, 404, '94.)

| t°. | Gms. I per 100 Gms. Solution. | t°. | Gms. I per 100 Gms. Solution. | t°. | Gms. I per 100 Gms. Solution. |
|------|-------------------------------|-----|-------------------------------|-----|-------------------------------|
| -100 | 0.32 | 0 | 7.89 | 30 | 19.26 |
| -80 | 0.51 | 10 | 10.51 | 36 | 22.67 |
| -63 | 1.26 | 15 | 12.35 | 40 | 25.22 |
| -20 | 4.14 | 20 | 14.62 | 42 | 26.75 |
| -10 | 5.52 | 25 | 16.92 | | |

SOLUBILITY OF IODINE IN MIXTURES OF CHLOROFORM AND ETHYL ALCOHOL, CHLOROFORM AND NORMAL PROPYL ALCOHOL, CHLOROFORM AND BENZENE, AND CHLOROFORM AND CARBON BISULPHIDE AT 15°.

(Bruner.)

| Gms. CHCl ₃ per 100 Gms. of Mixtures. | Grams I Dissolved per 100 cc. of Mixtures of: | | | |
|--|---|--|--|--|
| | CHCl ₃ + C ₂ H ₅ OH. | CH ₃ Cl + C ₃ H ₇ OH. | CH ₃ Cl + C ₆ H ₆ . | CH ₃ Cl + CS ₂ . |
| 0 | 15.67 | 14.93 | 10.40 | 17.63 |
| 10 | 9.43 | 13.16 | 9.84 | 15.93 |
| 20 | 8.69 | 11.20 | 8.78 | 14.20 |
| 30 | 7.80 | 8.98 | 7.74 | 12.16 |
| 40 | 7.09 | 8.09 | 6.96 | 10.20 |
| 50 | 6.62 | 7.82 | 6.20 | 9.08 |
| 60 | 6.24 | 7.09 | 5.34 | 7.72 |
| 70 | 5.77 | 6.42 | 4.89 | 6.42 |
| 80 | 5.06 | 5.54 | 4.53 | 5.27 |
| 90 | 4.34 | 4.52 | 4.07 | 4.32 |
| 100 | 3.62 | 3.62 | 3.62 | 3.62 |

SOLUBILITY OF IODINE IN MIXTURES OF CARBON TETRA CHLORIDE AND BENZENE AND IN MIXTURES OF CARBON TETRA CHLORIDE AND CARBON BISULPHIDE AT 15°.

(Bruner.)

| Gms. CCl ₄ per 100 Gms. of Mixtures. | Gms. I per 100 cc. of Mixture of: | | Gms. CCl ₄ per 100 Gms. of Mixtures. | Gms. I per 100 cc. of Mixture | |
|---|--|--------------------------------------|---|--|--------------------------------------|
| | CCl ₄ + C ₆ H ₆ . | CCl ₄ + CS ₂ . | | CCl ₄ + C ₆ H ₆ . | CCl ₄ + CS ₂ . |
| 0 | 10.40 | 17.6 | 60 | 4.90 | 5.55 |
| 10 | 9.44 | 14.44 | 70 | 4.09 | 4.50 |
| 20 | 8.53 | 12.33 | 80 | 3.41 | 3.37 |
| 30 | 7.77 | 10.34 | 90 | 2.74 | 2.60 |
| 40 | 6.63 | 8.60 | 100 | 2.06 | 2.06 |
| 50 | 5.70 | 6.83 | | | |

SOLUBILITY OF IODINE IN AQUEOUS GLYCERINE SOLUTIONS AT 25°.

(Herz and Knoch — Z. anorg. Chem. 45, 269, '05.)

Density of glycerine at 25°/4° = 1.2555; impurities about 1.5%.

| Wt. % Glycerine in Solvent. | Millimols I per 100 cc. Solution. | Grams I per 100 cc. Solution. | Density of Solutions at 25°/4°. |
|--------------------------------|--------------------------------------|----------------------------------|------------------------------------|
| 0 | 0.24 | 0.0304 | 0.9979 |
| 7.15 | 0.27 | 0.0342 | 1.0198 |
| 20.44 | 0.38 | 0.0482 | 1.0471 |
| 31.55 | 0.49 | 0.0621 | 1.0750 |
| 40.95 | 0.69 | 0.0875 | 1.0995 |
| 48.7 | 1.07 | 0.135 | 1.1207 |
| 69.2 | 2.20 | 0.278 | 1.1765 |
| 100.0 | 9.70 | 1.223 | 1.2646 |

DISTRIBUTION OF IODINE BETWEEN CARBON BISULPHIDE AND Aq. POTASSIUM OXALATE.

(Dawson — Z. physik. Chem. 56, 610, '06; Dawson and McRae — J. Chem. Soc. 81, 1086, '02.)

| Concentration of Aq. $K_2C_2O_4$. | Equiv. | Gms. I per Liter of | | Vol. of Solution which Contains 1 Mol. I. | Fraction of I Uncombined in Solution. |
|------------------------------------|--------|---------------------|---------------|---|---------------------------------------|
| | | Aq. Layer. | CS_2 Layer. | | |
| 1.0 | " | 2.408 | 10.82 | 105.3 | 0.005495 |
| 1.0 | " | 3.555 | 16.32 | 71.37 | 0.00561 |
| 1.0 | " | 5.766 | 27.91 | 43.99 | 0.005915 |
| 1.0 ⁵ | " | 6.861 | 34.01 | 36.98 | 0.006055 |
| 1.2 | " | 3.525 | 17.07 | 71.97 | 0.005645 |

DISTRIBUTION OF IODINE BETWEEN AMYL ALCOHOL AND WATER AND BETWEEN AMYL ALCOHOL AND AQUEOUS POTASSIUM IODIDE SOLUTIONS AT 25°.

(Herz and Fischer — Ber. 37, 4752, '04.)

The original results were plotted on cross-section paper, and the following tables made from the curves.

| Millimols I per 10 cc. Amyl Alcohol Layer in Each Case. | Millimols I per 10 cc. of H_2O and of Aq. KI Layers. | | | | | |
|---|--|--------------------|---------------------|---------------------|---------------------|----------------------|
| | H_2O . | $\frac{N}{10}$ KI. | $\frac{2N}{10}$ KI. | $\frac{3N}{10}$ KI. | $\frac{4N}{10}$ KI. | $\frac{10N}{10}$ KI. |
| 2.5 | 0.012 | 0.135 | 0.160 | 0.170 | 0.170 | ... |
| 3.0 | 0.014 | 0.150 | 0.185 | 0.200 | 0.200 | 0.160 |
| 4.0 | 0.018 | 0.180 | 0.235 | 0.255 | 0.270 | 0.240 |
| 5 | 0.021 | 0.210 | 0.280 | 0.315 | 0.340 | 0.315 |
| 6 | 0.025 | 0.230 | 0.330 | 0.375 | 0.410 | 0.390 |
| 7 | 0.029 | 0.250 | 0.375 | 0.430 | 0.480 | 0.470 |
| 8 | ... | 0.260 | 0.420 | 0.490 | 0.550 | 0.555 |
| 9 | ... | 0.270 | 0.450 | 0.550 | 0.620 | 0.640 |
| 10 | ... | 0.280 | 0.470 | 0.605 | 0.690 | 0.720 |
| 12 | ... | ... | 0.490 | 0.700 | 0.830 | 0.900 |
| 14 | ... | ... | 0.510 | 0.790 | 0.980 | 1.200 |
| 20 | ... | ... | 0.575 | ... | ... | ... |

| Gms. I per 100 cc. Amyl Alcohol Layer in Each Case. | Gms. I per 100 cc. of H_2O and of KI Layers. | | | | | |
|---|--|--------------------|---------------------|---------------------|---------------------|----------------------|
| | H_2O . | $\frac{N}{10}$ KI. | $\frac{2N}{10}$ KI. | $\frac{3N}{10}$ KI. | $\frac{4N}{10}$ KI. | $\frac{10N}{10}$ KI. |
| 3 | 0.014 | 0.164 | 0.20 | 0.21 | 0.21 | ... |
| 4 | 0.016 | 0.196 | 0.24 | 0.26 | 0.26 | 0.21 |
| 6 | 0.026 | 0.252 | 0.34 | 0.38 | 0.40 | 0.37 |
| 8 | 0.033 | 0.297 | 0.43 | 0.49 | 0.54 | 0.51 |
| 10 | 0.040 | 0.328 | 0.51 | 0.61 | 0.67 | 0.69 |
| 12 | ... | 0.341 | 0.58 | 0.73 | 0.81 | 0.84 |
| 14 | ... | ... | 0.60 | 0.83 | 0.95 | 1.00 |
| 16 | ... | ... | 0.63 | 0.91 | 1.09 | 1.20 |
| 18 | ... | ... | 0.64 | ... | ... | ... |
| 25 | ... | ... | 0.71 | ... | ... | ... |

The original figures for $5N/10$ and $10N/10$ KI solutions give practically identical curves.

Results for the distribution of Iodine between $N/10$ KI solutions on the one hand, and mixtures in various proportions of C_6H_6 + CS_2 , $C_6H_5CH_3$ + CS_2 , C_6H_6 + $C_6H_5CH_3$, C_6H_6 + light petroleum, CS_2 + light petroleum, CS_2 + $CHCl_3$, $CHCl_3$ + C_6H_6 , CCl_4 + CS_2 and CCl_4 + $C_6H_5CH_3$, on the other hand, are given by Dawson — J. Chem. Soc., 81, 1086, '02.

DISTRIBUTION OF IODINE BETWEEN WATER AND BROMOFORM, WATER AND CARBON BISULPHIDE, AND WATER AND CARBON

TETRA CHLORIDE AT 25°. (Jakowkin — Z. physik. Chem. 18, 590, '95.)

Original results plotted on cross-section paper and table made from curves. Jakowkin points out that the results of Berthelot and Jungfleisch — Ann. chim. phys. (4) 26, 400, '72, are incorrect on account of the presence of HI.

| Grams I per Liter of H ₂ O Layer in Each Case. | Grams I per Liter of: | | |
|--|--------------------------|------------------------|-------------------------|
| | CHBr ₃ Layer. | CS ₂ Layer. | CCl ₄ Layer. |
| 0.05 | 20 | 30 | 4.0 |
| 0.10 | 45 | 60 | 8.5 |
| 0.15 | 71 | 91 | 13.0 |
| 0.20 | 100 | 126 | 17.5 |
| 0.25 | 130 | 160 | 22.0 |

IODOFORM CHI₃, IODOL C₄I₄NH (Tetra Iodo Pyrrol).

SOLUBILITY IN SEVERAL SOLVENTS.

(U. S. P.; Vulpus — Pharm. Centr. 34, 117, '93.)

| Solvent. | t°. | Grams per 100 Grams Solvent. | |
|------------|--------|------------------------------|-----------------------------------|
| | | CHI ₃ . | C ₄ I ₄ NH. |
| Water | 25 | 0.0106 | 0.0204 |
| Alcohol | 25 | 2.14 (1.43 gms. (V.)) | 11.1 |
| Alcohol | b. pt. | (10.0 gms. (V.)) | ... |
| Ether | 25 | 19.2 (16.6 gms. (V.)) | 66.6 |
| Chloroform | 25 | ... | 0.95 |

IRIDIUM DOUBLE SALTS.

SOLUBILITY IN WATER.

(Palmaer — Ber. 23, 3817; 24, 2090, '91.)

| Double Salt. | | Formula. | t°. | Gms. per 100 Gms. H ₂ O. |
|--------------------------|--|---|------------|--|
| Irido Pentamine Bromide | | Ir(NH ₂) ₅ Br ₃ | 12.5 | 0.284 |
| " " Bromonitrate | | Ir(NH ₂) ₅ Br(NO ₂) ₂ | 18 | 5.58 |
| " " Tri Chloride | | Ir(NH ₂) ₅ Cl ₃ | 15.1 | 6.53 |
| " " Chloro Bromide | | Ir(NH ₂) ₅ ClBr ₂ | 15 | 0.47 |
| " " Chloro Iodide | | Ir(NH ₂) ₅ ClI ₂ | 15 | 0.95 |
| " " Chloro Nitrate | | Ir(NH ₂) ₅ Cl(NO ₂) ₂ | 15.4 | 1.94 |
| " " Chloro Sulphate | | Ir(NH ₂) ₅ ClSO ₄ .2H ₂ O | 15.0 | 0.74 |
| " " Nitrate | | Ir(NH ₂) ₅ (NO ₂) ₃ | 16 | 0.28 |
| " Aquo Pentamine Bromide | | Ir(NH ₂) ₅ (OH ₂)Br ₃ | ord. temp. | 25.0 |
| " " " Chloride | | Ir(NH ₂) ₅ (OH ₂)Cl ₃ | ord. temp. | 74.7 |
| " " " Nitrate | | Ir(NH ₂) ₅ (OH ₂)(NO ₂) ₃ | 17 | 10.0 |

IRON BROMIDE (Ferrous) FeBr₂.6H₂O.

SOLUBILITY IN WATER.

(Etard — Ann. chim. phys. [7] 2, 537, '94.)

| t°. | Gms. FeBr ₂ per 100 Gms. Sol. | t°. | Gms. FeBr ₂ per 100 Gms. Sol. | t°. | Gms. FeBr ₂ per 100 Gms. Sol. |
|-----|---|-----|---|-----|---|
| -20 | 47.0 | 30 | 55.0 | 60 | 59.0 |
| 0 | 50.5 | 40 | 56.2 | 80 | 61.5 |
| 20 | 53.5 | | | 100 | 64.0 |

IRON CARBONATE (Ferrous) FeCO₃.

100 gms. H₂O saturated with CO₂ at 6-8 atmospheres dissolve 0.073 gram FeCO₃.

(Wagner — Jahresber. Chem. 135, '67.)

IRON CHLORIDE (Ferrous) $\text{FeCl}_2 \cdot 4\text{H}_2\text{O}$. SOLUBILITY IN WATER.
 (Etard.)

| t°. | Gms. FeCl_2 per 100 Gms. Solution. | Solid Phase. | t°. | Gms. FeCl_2 per 100 Gms. Solution. | Solid Phase. |
|-----|---|---|-----|---|---|
| 10 | 39.2 | $\text{FeCl}_2 \cdot 4\text{H}_2\text{O}$ | 60 | 47.0 | $\text{FeCl}_2 \cdot 4\text{H}_2\text{O}$ |
| 15 | 40.0 | " | 80 | 50.0 | " |
| 25 | 41.5 | " | 87 | 51.2 | $\text{FeCl}_2 \cdot 4\text{H}_2\text{O} + \text{FeCl}_3$ |
| 30 | 42.2 | " | 90 | 51.3 | FeCl_3 |
| 40 | 43.6 | " | 100 | 51.4 | " |
| 50 | 45.2 | " | 120 | 51.8 | " |

SOLUBILITY OF IRON CHLORIDE (FERRIC) Fe_2Cl_6 IN WATER.
 (Roozeboom — Z. physik. Chem. 10, 477, '92.)

| t°. | Mols. Fe_2Cl_6 per 100 Mols. H_2O . | Gms. FeCl_3 per 100 Gms. H_2O . | Solid Phase. | t°. | Mols. Fe_2Cl_6 per 100 Mols. H_2O . | Gms. FeCl_3 per 100 Gms. H_2O . | Solid Phase. |
|-----|---|--|---|------|---|--|---|
| | | | $\text{Fe}_2\text{Cl}_6 \cdot 12\text{H}_2\text{O}$. | | | | $\text{Fe}_2\text{Cl}_6 \cdot 5\text{H}_2\text{O}$ (con.). |
| -55 | 2.75 | 49.52 | 33.12 | 35 | 15.64 | 281.6 | 73.79 |
| -27 | 2.98 | 53.60 | 34.93 | 50 | 17.50 | 315.2 | 75.91 |
| 0 | 4.13 | 74.39 | 42.66 | 55 | 19.15 | 344.8 | 77.52 |
| +20 | 5.10 | 91.85 | 47.88 | 55 | 20.32 | 365.9 | 78.54 |
| 30 | 5.93 | 106.8 | 51.64 | | | | Solid Phase, $\text{Fe}_2\text{Cl}_6 \cdot 4\text{H}_2\text{O}$. |
| 37 | 8.33 | 150.0 | 60.01 | 50 | 19.96 | 359.3 | 78.23 |
| 30 | 11.20 | 201.7 | 66.85 | 55 | 20.32 | 365.9 | 78.54 |
| 20 | 12.83 | 231.1 | 69.79 | 60 | 20.70 | 372.8 | 78.86 |
| 8 | 13.7 | 246.7 | 71.15 | 69 | 21.53 | 387.7 | 79.50 |
| | | | Solid Phase, $\text{Fe}_2\text{Cl}_6 \cdot 7\text{H}_2\text{O}$. | 73.5 | 25.0 | 450.2 | 81.81 |
| 20 | 11.35 | 204.4 | 67.14 | 70 | 27.9 | 502.4 | 83.41 |
| 32 | 13.55 | 244.0 | 70.92 | 66 | 29.2 | 525.9 | 84.03 |
| 30 | 15.12 | 272.4 | 73.13 | | | | Solid Phase, Fe_2Cl_6 . |
| 25 | 15.54 | 280.0 | 73.69 | 66 | 29.2 | 525.9 | 84.03 |
| | | | Solid Phase, $\text{Fe}_2\text{Cl}_6 \cdot 5\text{H}_2\text{O}$. | 75 | 28.42 | 511.4 | 83.66 |
| 12 | 12.87 | 231.8 | 69.87 | 80 | 29.20 | 525.9 | 84.03 |
| 27 | 14.85 | 267.5 | 72.78 | 100 | 29.75 | 535.8 | 84.26 |

**SOLUBILITY OF FERRIC CHLORIDE IN AQUEOUS SOLUTIONS OF
 AMMONIUM CHLORIDE AT 25°, 35°, AND 45°.**
 (Mohr — Z. physik. Chem. 27, 197, '98.)

Results at 25°. Results at 35°. Results at 45°.

| Mols. per 100 Mols. H_2O . | | Mols. per 100 Mols. H_2O . | | Mols. per 100 Mols. H_2O . | | Solid Phase in Each Case. |
|---|----------------------------|---|----------------------------|---|----------------------------|---|
| NH_4Cl . | Fe_2Cl_6 . | NH_4Cl . | Fe_2Cl_6 . | NH_4Cl . | Fe_2Cl_6 . | |
| 0 | 10.98 | 0 | 13.36 | 0.0 | 33.4 | $\text{Fe}_2\text{Cl}_6 \cdot 12\text{H}_2\text{O}$ (5 H_2O at 45°) |
| 1.57 | 10.74 | 1.41 | 13.05 | ... | ... | Hydrate + Double Salt |
| 2.48 | 9.02 | 3.08 | 9.28 | 4.08 | 9.58 | Double Salt |
| 5.28 | 7.73 | 6.98 | 7.64 | ... | ... | " |
| 9.59 | 6.77 | 10.76 | 6.70 | 13.09 | 6.31 | " |
| 9.83 | 6.70 | 11.60 | 6.52 | 13.54 | 6.28 | Double Salt + Mixed Crystals |
| 9.65 | 6.07 | 12.28 | 6.08 | 12.91 | 5.49 | Mixed Crystals |
| 9.93 | 5.23 | 11.57 | 3.98 | 13.49 | 4.84 | " |
| 9.92 | 3.97 | 11.89 | 3.38 | 13.46 | 4.99 | " |
| 10.31 | 2.05 | 13.23 | 1.38 | ... | ... | " |
| 13.30 | 0.0 | 14.79 | 0.0 | 16.28 | 0.0 | NH_4Cl |

SOLUBILITY OF FERRIC CHLORIDE IN AQUEOUS SOLUTIONS OF
AMMONIUM CHLORIDE AT 15°.

(Roozeboom — Z. physik. Ch. 10, 148, '92.)

| Mols. per 100 Mols. H ₂ O. | | Grams per 100 Gms. H ₂ O. | | Solid Phase. |
|---------------------------------------|---------------------|--------------------------------------|---------------------|---|
| NH ₄ Cl. | FeCl ₃ . | NH ₄ Cl. | FeCl ₃ . | |
| 0.0 | 9.30 | 0.0 | 83.88 | Fe ₂ Cl ₆ .12H ₂ O |
| 1.09 | 9.57 | 3.24 | 86.32 | " |
| 1.36 | 9.93 | 4.03 | 91.61 | Fe ₂ Cl ₆ .12H ₂ O + Double Salt |
| 2.00 | 9.27 | 5.92 | 83.64 | Double Salt |
| 2.79 | 8.71 | 8.31 | 78.77 | " |
| 4.05 | 8.09 | 12.08 | 73.20 | " |
| 6.41 | 7.18 | 19.12 | 64.83 | " |
| 10.78 | 6.21 | 32.04 | 56.00 | " |
| 7.82 | 6.75 | 23.21 | 60.83 | Mixed Crystals containing 7.29% FeCl ₃ |
| 7.62 | 5.94 | 22.63 | 53.47 | " " 5.55 " |
| 7.70 | 5.03 | 22.90 | 45.42 | " " 4.4 " |
| 7.81 | 4.34 | 23.23 | 39.13 | " " 3.8 " |
| 8.52 | 2.82 | 25.33 | 25.43 | " " 1.64 " |
| 10.95 | 0.68 | 32.55 | 6.15 | " " 0.31 " |
| 11.88 | 0.0 | 35.30 | 0.0 | NH ₄ Cl |

SOLUBILITY OF FERRIC CHLORIDE IN AQUEOUS HYDROCHLORIC ACID
SOLUTIONS AT DIFFERENT TEMPERATURES.

(Roozeboom and Schreinemaker — Z. physik. Chem. 15, 633, '94.)

| Mols. per 100 Mols. H ₂ O. | | Gms. per 100 Gms. H ₂ O. | | Solid Phase. | Mols. per 100 Mols. H ₂ O. | | Gms. per 100 Gms. H ₂ O. | | Solid Phase. |
|---------------------------------------|---------------------|-------------------------------------|---------------------|---|--|---------------------|-------------------------------------|---------------------|---|
| HCl. | FeCl ₃ . | HCl. | FeCl ₃ . | | HCl. | FeCl ₃ . | HCl. | FeCl ₃ . | |
| Results at 0°. | | | | | Results at 25° (con.). | | | | |
| 0 | 8.25 | 0 | 74.30 | Fe ₂ Cl ₆ .12H ₂ O | 0.0 | 29.00 | 0.0 | 261.1 | Fe ₂ Cl ₆ .3H ₂ O |
| 7.52 | 6.51 | 15.22 | 58.62 | | 7.5 | 29.75 | 15.18 | 267.9 | |
| 13.37 | 6.33 | 27.06 | 57.01 | | 19.5 | 35.25 | 39.46 | 317.4 | |
| 16.80 | 8.70 | 33.99 | 78.34 | | 19.5 | 35.25 | 39.46 | 317.4 | Fe ₂ Cl ₆ .4H ₂ O |
| 18.45 | 10.23 | 37.34 | 92.10 | | 20.6 | 35.34 | 41.68 | 318.3 | |
| 20.40 | 15.40 | 41.28 | 138.7 | | 31.34 | 41.58 | 63.42 | 374.4 | |
| 20.10 | 16.00 | 40.67 | 144.1 | | 33.00 | 43.00 | 66.77 | 387.3 | Fe ₂ Cl ₆ .2HCl + 4H ₂ O |
| 19.95 | 17.70 | 40.37 | 159.4 | | 34.65 | 44.80 | 70.11 | 403.4 | |
| 19.00 | 22.75 | 38.45 | 204.8 | | 40.41 | 40.25 | 81.77 | 362.4 | |
| 18.05 | 23.41 | 36.53 | 210.8 | | 39.03 | 41.38 | 78.98 | 372.7 | |
| 18.05 | 23.40 | 36.53 | 210.8 | Fe ₂ Cl ₆ .7H ₂ O | 35.74 | 45.24 | 72.33 | 407.4 | |
| 19.50 | 25.93 | 39.55 | 233.5 | Fe ₂ Cl ₆ .5H ₂ O | Results at 40°. | | | | |
| 24.12 | 30.04 | 48.81 | 270.5 | | | 32.4 | 0.0 | 291.7 | Fe ₂ Cl ₆ .5H ₂ O |
| 26.00 | 32.16 | 52.60 | 289.6 | | 13.4 | 37.45 | 27.11 | 337.3 | |
| 26.00 | 32.16 | 52.60 | 289.6 | | 13.4 | 37.45 | 27.11 | 337.3 | Fe ₂ Cl ₆ .4H ₂ O |
| 34.60 | 38.11 | 70.01 | 343.2 | | 27.0 | 50.80 | 54.64 | 457.5 | |
| 37.27 | 36.60 | 75.41 | 329.6 | | 0 | 58.0 | 0.0 | 522.3 | Fe ₂ Cl ₆ |
| 34.60 | 38.11 | 70.01 | 343.2 | | 27 | 50.8 | 54.64 | 457.5 | |
| | | | | | 42.01 | 48.64 | 85.00 | 438.0 | |
| | | | | | 42.50 | 47.52 | 86.72 | 428.0 | Fe ₂ Cl ₆ .2HCl + 4H ₂ O |
| | | | | | 42.01 | 48.64 | 85.00 | 438.0 | |
| | | | | | | | | | |
| Results at 25°. | | | | | Results for other temperatures are also given in the original paper. | | | | |
| 0.0 | 10.90 | 0.0 | 98.15 | Fe ₂ Cl ₆ .12H ₂ O | | | | | |
| 2.33 | 23.72 | 4.715 | 213.6 | | | | | | |
| 0.0 | 24.5 | 0.0 | 220.7 | | | | | | |
| 0.0 | 23.5 | 0.0 | 211.6 | Fe ₂ Cl ₆ .7H ₂ O | | | | | |
| 2.33 | 23.72 | 4.715 | 213.4 | | | | | | |
| 7.50 | 29.75 | 15.18 | 267.9 | | | | | | |
| 0.0 | 31.50 | 0.0 | 283.6 | | | | | | |

SOLUBILITY OF THE SALT PAIR FeCl_3NaCl IN WATER AT 21° .

(Hinrichsen and Sachsel — Z. physik. Chem. 50, 94, '04-'05.)

| Grams Used. | | Gms. per 100 Gms. Solution. | | G. Mols. per 100 Mols. H_2O . | | Solid Phase. |
|-------------------|-----------------|-----------------------------|-----------------|---|-----------------|-----------------|
| FeCl_3 . | NaCl . | FeCl_3 . | NaCl . | FeCl_3 . | NaCl . | |
| 0 | 3.6 | 0 | 36.10 | 0 | 11.2 | NaCl |
| 1.8 | 3.0 | 24.27 | 9.10 | 2.69 | 2.8 | Mix Crystals |
| 3.6 | 2.5 | 25.40 | 8.45 | 2.81 | 2.6 | " |
| 5.5 | 2.0 | 26.40 | 5.25 | 2.93 | 2.54 | " |
| 7.2 | 1.5 | 38.15 | 3.90 | 4.23 | 1.22 | " |
| 9.0 | 1.0 | 45.38 | 2.45 | 5.03 | 0.75 | " |
| 10.8 | 0.5 | 46.75 | 2.11 | 5.18 | 0.65 | " |
| 10.8 | 0.0 | 83.39 | 0.0 | 9.3 | 0.0 | FeCl_3 |

SOLUBILITY OF THE SALT PAIR FeCl_3KCl IN WATER AT 21° .

(H. and S.)

| Grams Used. | | Gms. per 100 Gms. Solution. | | Gm. Mols. per 100 Mols. H_2O . | | Solid Phase. |
|-------------------|----------------|-----------------------------|----------------|--|----------------|-----------------|
| FeCl_3 . | KCl . | FeCl_3 . | KCl . | FeCl_3 . | KCl . | |
| 0 | 35 | 0 | 34.97 | 0 | 8.45 | KCl |
| 13 | 28 | 13.44 | 24.45 | 1.49 | 5.90 | Mix Crystals |
| 18 | 21 | 23.18 | 16.54 | 2.57 | 3.99 | " |
| 23 | 18.5 | 28.05 | 11.69 | 3.11 | 2.82 | " |
| 28 | 16 | 35.72 | 11.68 | 3.96 | 2.82 | " |
| 31 | 10.5 | 36.62 | 11.19 | 4.06 | 2.70 | Double Salt |
| 36.2 | 9 | 37.35 | 13.67 | 4.14 | 3.30 | " |
| 46.5 | 6 | 51.69 | 7.54 | 5.73 | 1.82 | " |
| 15.5 | 0 | 83.89 | 0.0 | 9.3 | 0.0 | FeCl_3 |

SOLUBILITY OF THE SALT PAIR FeCl_3CsCl IN WATER AT 21° .

(H. and S.)

| Grams Used. | | Gms. per 100 Gms. Solution. | | Gm. Mols. per 100 Mols. H_2O . | | Solid Phase. |
|-------------------|-----------------|-----------------------------|-----------------|--|-----------------|--|
| FeCl_3 . | CsCl . | FeCl_3 . | CsCl . | FeCl_3 . | CsCl . | |
| 0 | 65 | 0.0 | 65.0 | 0.0 | 6.95 | CsCl |
| 0.6 | 11.6 | 0.45 | 55.18 | 0.05 | 5.9 | $\text{FeCl}_3\text{CsCl}\cdot\text{H}_2\text{O}$ |
| 1.4 | 10.2 | 2.1 | 52.38 | 0.23 | 5.6 | " |
| 2.2 | 8.8 | 5.24 | 51.44 | 0.57 | 5.5 | " |
| 2.0 | 7.4 | 7.8 | 47.70 | 0.86 | 5.1 | $\text{FeCl}_3\cdot 2\text{CsCl}\cdot\text{H}_2\text{O}$ |
| 3.8 | 6.0 | 8.93 | 41.15 | 0.99 | 4.4 | " |
| 4.6 | 4.6 | 15.34 | 25.25 | 1.70 | 2.7 | " |
| 5.4 | 2.8 | 21.65 | 14.96 | 2.40 | 1.6 | " |
| 6.2 | 1.4 | 27.96 | 8.42 | 3.10 | 0.9 | " |
| 35.0 | 0.2 | 48.71 | 0.94 | 5.40 | 0.1 | " |
| 35.0 | 0.0 | 83.89 | 0.0 | 9.3 | 0.0 | FeCl_3 |

100 gms. abs. acetone dissolve 62.9 gms. FeCl_3 at 18° .

(Naumann — Ber. 37, 4332, '04.)

IRON NITRATE (Ferrous) $\text{Fe}(\text{NO}_3)_2$.

SOLUBILITY IN WATER.

(Funk — Wiss. Abh. p. t. Reichenstalt 3, 438, '00.)

| t°. | Gms. $\text{Fe}(\text{NO}_3)_2$ per 100 Gms. Sol. | Mols. $\text{Fe}(\text{NO}_3)_2$ per 100 Mols. H_2O . | Solid Phase. | t°. | Gms. $\text{Fe}(\text{NO}_3)_2$ per 100 Gms. Sol. | Mols. $\text{Fe}(\text{NO}_3)_2$ per 100 Mols. H_2O . | Solid Phase. |
|-------|---|---|--|------|---|---|--|
| -27 | 35.66 | 5.54 | $\text{Fe}(\text{NO}_3)_2 \cdot 9\text{H}_2\text{O}$ | -9 | 39.68 | 6.57 | $\text{Fe}(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}$ |
| -21.5 | 36.10 | 5.64 | " | 0 | 41.53 | 7.10 | " |
| -19 | 36.56 | 5.76 | " | 18 | 45.14 | 8.23 | " |
| -15.5 | 37.17 | 5.91 | " | 24 | 46.51 | 8.70 | " |
| | | | | 60.5 | 62.50 | 16.67 | " |

Density of solution saturated at 18° = 1.497.

IRON OXIDES, HYDROXIDE and SULPHIDE.

SOLUBILITY IN AQUEOUS SUGAR SOLUTIONS.

(Stolle — Z. Ver Zuckerind. 50, 340, '00.)

| % Sugar in Sol- vent. | $\text{Fe}_2(\text{OH})_6$ at: | | | Fe_2O_3 at: | | One Liter of Sugar Solutions Dissolves Milligrams of: | | | FeS at: | | |
|-----------------------------|--------------------------------|------|------|-----------------------------|------|---|------|------|------------------|------|------|
| | 17.4°. | 45°. | 75°. | 17.5°. | 45°. | 17.5°. | 45°. | 75°. | 17.5°. | 45°. | 75°. |
| 10 | 3.4 | 3.4 | 6.1 | 1.4 | 2.0 | 10.3 | 10.3 | 12.4 | 3.8 | 3.8 | 5.3 |
| 30 | 2.3 | 2.7 | 3.8 | 1.4 | ... | 12.4 | 10.3 | 12.4 | 7.1 | 9.1 | 7.2 |
| 50 | 2.3 | 1.9 | 3.4 | 0.8 | 1.1 | 14.5 | 10.3 | 14.5 | 9.9 | 19.8 | 9.1 |

IRON PHOSPHATE $\text{Fe}_2(\text{PO}_4)_3$.

THE ACTION OF WATER AND OF AQUEOUS SALT SOLUTIONS UPON FERRIC PHOSPHATE.

(Lachowicz — Monatsh. Chem. 13, 357, '92; Cameron and Hurst — J. Am. Chem. Soc. 26, 888, '04.)

The experiments show that the ordinary precipitation methods for the production of ferric phosphate give products which do not conform to the formula $\text{Fe}_2(\text{PO}_4)_3$. By digesting such samples with water very little is dissolved, but the material is decomposed to an extent depending upon the relative amounts of solid and solvent used. The amount of PO_4 dissolved per gram of $\text{Fe}_2(\text{PO}_4)_3$ varies from about 0.0026 gram removed by 5 cc. H_2O to 0.0182 gram removed by 800 cc. H_2O at the ordinary temperature.

IRON SULPHATE (Ferrous) $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$.

SOLUBILITY IN WATER.

(Fränckel — Heidelberg '05, Landolt and Börnstein's Tabellen, 3d ed. p. 537, '06.)

| t°. | Gms. FeSO_4 per 100 Gms. H_2O . | Solid Phase. | t°. | Gms. FeSO_4 per 100 Gms. H_2O . | Solid Phase. |
|-------|--|---|------|--|---|
| -1.82 | 14.98 | $10c + \text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ | 56.6 | 54.58 | $\text{FeSO}_4 \cdot 7\text{H}_2\text{O} + \text{FeSO}_4 \cdot 4\text{H}_2\text{O}$ |
| 0 | 15.62 | $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ | 60 | 55.02 | $\text{FeSO}_4 \cdot 4\text{H}_2\text{O}$ |
| 10 | 20.85 | " | 70 | 56.04 | " |
| 20 | 26.42 | " | 75.8 | 56.8 | $\text{FeSO}_4 \cdot 4\text{H}_2\text{O} + \text{FeSO}_4 \cdot \text{H}_2\text{O}$ |
| 30 | 33.00 | " | 80 | 50.6 | $\text{FeSO}_4 \cdot \text{H}_2\text{O}$ |
| 40 | 40.20 | " | 90 | 43.0 | " |
| 50 | 48.55 | " | | | |

100 grams sat. solution in Glycol contain 6.0 grams FeSO_4 at ordinary temperature.
(de Coninck.)

161 IRON POTASSIUM SULPHATE

IRON POTASSIUM SULPHATE (Ferrous) $\text{FeSO}_4 \cdot \text{K}_2\text{SO}_4 \cdot 6\text{H}_2\text{O}$.

SOLUBILITY IN WATER.

(Tobler — Liebig's Ann. 95, 193, '55.)

| t°. | Gms. $\text{K}_2\text{Fe}(\text{SO}_4)_2$ per 100 Grams H_2O . | t°. | Gms. $\text{K}_2\text{Fe}(\text{SO}_4)_2$ per 100 Grams H_2O . |
|------|--|-----|--|
| 0 | 19.6 | 35 | 41.0 |
| 10 | 24.5 | 40 | 45.0 |
| 14.5 | 29.1 | 55 | 56.0 |
| 16 | 30.9 | 65 | 57.3 |
| 25 | 36.5 | 70 | 64.2 |

SOLUBILITY OF MIXTURES OF FERROUS SULPHATE $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ AND SODIUM SULPHATE $\text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O}$ IN WATER.

(Koppel — Z. physik. Chem. 52, 405, '05.)

| t°. | Gms. per 100 Gms. Solution. | | Gms. per 100 Gms. H_2O . | | Solid Phase. |
|-------|--------------------------------|----------------------------|---|----------------------------|--|
| | FeSO_4 . | Na_2SO_4 . | FeSO_4 . | Na_2SO_4 . | |
| 0 | 14.54 | 4.93 | 18.06 | 6.11 | $\text{FeSO}_4 \cdot 7\text{H}_2\text{O} + \text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O}$ |
| 15.5 | 17.76 | 11.32 | 25.05 | 15.97 | " " |
| 21.8 | 16.57 | 15.32 | 24.34 | 22.51 | $\text{FeNa}_2(\text{SO}_4)_2 \cdot 4\text{H}_2\text{O}$ |
| 24.92 | 16.21 | 15.13 | 23.62 | 22.04 | " |
| 35 | 16.35 | 14.98 | 23.91 | 21.83 | " |
| 40 | 16.37 | 15.42 | 24.01 | 22.62 | " |
| 18.8 | 18.13 | 13.8 | 26.63 | 20.28 | $\text{FeNa}_2(\text{SO}_4)_2 \cdot 4\text{H}_2\text{O} + \text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ |
| 23 | 19.58 | 12.5 | 28.82 | 18.4 | " " |
| 27 | 20.97 | 11.3 | 30.95 | 16.64 | " " |
| 31 | 22.91 | 9.71 | 33.99 | 14.41 | " " |
| 35 | 23.85 | 9.26 | 35.61 | 13.85 | " " |
| 40 | 26.32 | 7.85 | 39.98 | 11.92 | " " |
| 18.8 | 18.23 | 14.83 | 27.23 | 22.16 | $\text{FeNa}_2(\text{SO}_4)_2 \cdot 4\text{H}_2\text{O} + \text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O}$ |
| 23 | 13.83 | 18.04 | 20.31 | 26.48 | " " |
| 28 | 7.66 | 24.41 | 11.28 | 35.94 | " " |
| 31 | 4.58 | 29.50 | 6.95 | 44.75 | " " |
| 35 | 4.04 | 30.49 | 6.16 | 46.58 | $\text{FeNa}_2\text{SO}_4 \cdot 4\text{H}_2\text{O} + \text{Na}_2\text{SO}_4$ |
| 40 | 4.10 | 30.60 | 6.27 | 46.99 | " " |

LANTHANUM BROMATE 162**LANTHANUM BROMATE** $\text{La}(\text{BrO}_3)_3 \cdot 9\text{H}_2\text{O}$.100 gms. H_2O dissolve 28.5 gms. lanthanum bromate at 15° .

(Marignac.)

LANTHANUM SULPHATE $\text{La}_2(\text{SO}_4)_3$.

SOLUBILITY IN WATER.

(Muthmann and Rölzig — Ber. 31, 1723, '98.)

| t°. | Gms. $\text{La}_2(\text{SO}_4)_3$ per 100 Gms. | | t°. | Gms. $\text{La}_2(\text{SO}_4)_3$ per 100 Gms. | |
|-----|--|--------|-----|--|--------|
| | Solution. | Water. | | Solution. | Water. |
| 0 | 2.91 | 3.0 | 50 | 1.47 | 1.5 |
| 14 | 2.53 | 2.6 | 75 | 0.95 | 0.96 |
| 30 | 1.86 | 1.9 | 100 | 0.68 | 0.69 |

LEAD Pb.

MUTUAL SOLUBILITY OF LEAD AND ZINC.

(Spring and Romanoff — Z. anorg. Chem. 13, 34, '96.)

| t°. | Upper Layer. | | Lower Layer. | | t°. | Upper Layer. | | Lower Layer. | |
|-----|--------------|------|--------------|------|-----------------------|--------------|------|--------------|------|
| | %Pb. | %Zn. | %Pb. | %Zn. | | %Pb. | %Zn. | %Pb. | %Zn. |
| 334 | 98.8 | 1.2 | ... | ... | 650 | 83.0 | 17.0 | 7.0 | 93.0 |
| 419 | ... | ... | 1.5 | 98.5 | 740 | 79.0 | 21.0 | 10.0 | 90.0 |
| 450 | 92.0 | 8.0 | ... | ... | 800 | 75.0 | 25.0 | 14.0 | 86.0 |
| 475 | 91.0 | 9.0 | 2.0 | 98.0 | 900 | 59.0 | 41.0 | 25.5 | 74.5 |
| 584 | 86.0 | 14.0 | 5.0 | 95.0 | 910-920 (crit. temp.) | | | | |

LEAD ACETATE $\text{Pb}(\text{C}_2\text{H}_3\text{O}_2)_2 \cdot 3\text{H}_2\text{O}$.

SOLUBILITY IN SEVERAL SOLVENTS.

(U. S. P.)

| Solvent. | Grams $\text{Pb}(\text{C}_2\text{H}_3\text{O}_2)_2$ per 100 Grams Solvent at: | |
|-------------------------|---|--------|
| | 25°. | b. pt. |
| Water | 50 | 200 |
| Alcohol | 3.3 | 100 |
| Alcohol (0.941 Sp. Gr.) | 12.5 (per 100 cc. at 15.5°) | |
| Glycerine | 20.0 (15°) | |

LEAD BENZOATE $\text{Pb}(\text{C}_7\text{H}_5\text{O}_2)_2 \cdot \text{H}_2\text{O}$.

SOLUBILITY IN WATER.

(Paietta — Gazz. chim. ital. 36, II, 67, '06.)

| t°. | 18°. | 40.6°. | 49.5°. |
|---|-------|--------|--------|
| Gms. $\text{Pb}(\text{C}_7\text{H}_5\text{O}_2)_2 \cdot \text{H}_2\text{O}$ per 100 gms. sat. solution | 0.149 | 0.249 | 0.310 |

LEAD BROMATE $\text{Pb}(\text{BrO}_3)_2 \cdot \text{H}_2\text{O}$.

100 gms. cold water dissolve 1.33 gms. lead bromate.

(Rammelsberg — Pogg. Annalen. 52, 96, '41; Böttger — Z. physik. Chem. 46, 602, '03.)

LEAD BROMIDE PbBr_2 .

SOLUBILITY IN WATER.

(Lichty — J. Am. Chem. Soc. 25, 474, '03.)

| t°. | Density of Solutions, H_2O at 0°. | Gms. PbBr_2 per 100 | | Milligram Mols. PbBr_2 per 100 | |
|-----|---|------------------------------|-----------------------------|---|-----------------------------|
| | | cc. Solution. | Gms. H_2O . | cc. Solution. | Gms. H_2O . |
| 0 | 1.0043 | 0.4554 | 0.4554 | 1.242 | 1.242 |
| 15 | 1.0053 | 0.7285 | 0.7305 | 1.987 | 1.989 |
| 25 | 1.0061 | 0.9701 | 0.9744 | 2.646 | 2.655 |
| 35 | 1.0060 | 1.3124 | 1.3220 | 3.577 | 3.603 |
| 45 | 1.0059 | 1.7259 | 1.7457 | 4.705 | 4.760 |
| 55 | 1.0046 | 2.1024 | 2.1376 | 5.731 | 5.827 |
| 65 | 1.0028 | 2.516 | 2.574 | 6.859 | 7.016 |
| 80 | 1.0000 | 3.235 | 3.343 | 8.819 | 9.113 |
| 95 | 0.9995 | 4.1767 | 4.3613 | 11.386 | 11.890 |
| 100 | ... | 4.550 | 4.751 | 12.40 | 12.94 |

SOLUBILITY OF LEAD BROMIDE IN AQUEOUS HYDROBROMIC ACID
AT 10°.

100 grams H_2O containing 72.0 grams HBr dissolve 55.0 grams PbBr_2 per 100 gms. solvent, and solution has Sp. Gr. 2.06.

(Ditte — Compt. rend. 92, 719, '81.)

LEAD CARBONATE PbCO_3 .

SOLUBILITY IN WATER BY ELECTRICAL CONDUCTIVITY METHOD.

(Kohlrausch and Rose — Z. physik. Chem. 12, 241, '03; Böttger — *Ibid.* 46, 602, '03.)

1 liter of water dissolves 0.0011 — 0.0017 gram PbCO_3 at 20°.

LEAD CHLORATE $\text{Pb}(\text{ClO}_3)_2$.

100 grams H_2O dissolve 151.3 grams $\text{Pb}(\text{ClO}_3)_2$, or 100 grams sat. solution contain 60.2 gms. $\text{Pb}(\text{ClO}_3)_2$ at 18°. Density of solution, 1.947.

(Mylius and Funk — Ber. 30, 1718, '97.)

LEAD CHLORIDE PbCl_2 .

SOLUBILITY IN WATER.

(Lichty; see also Formanek — Chem. Centr. 18, 270, '87; Bell — Chem. News, 16, 69, '67; Ditte — Compt. rend. 92, 718, '81.)

| t°. | Density of Solutions, H_2O at 0°. | Gms. PbCl_2 per 100 | | Milligram Mols. PbCl_2 per 100 | |
|-----|---|------------------------------|-----------------------------|---|------------------------------|
| | | cc. Solution. | Gms. H_2O . | cc. Solution. | Grams H_2O . |
| 0 | 1.0066 | 0.6728 | 0.6728 | 2.421 | 2.421 |
| 15 | 1.0069 | 0.9070 | 0.9090 | 3.265 | 3.272 |
| 25 | 1.0072 | 1.0786 | 1.0842 | 3.882 | 3.903 |
| 35 | 1.0060 | 1.3150 | 1.3244 | 4.733 | 4.767 |
| 45 | 1.0042 | 1.5498 | 1.5673 | 5.579 | 5.644 |
| 55 | 1.0020 | 1.8019 | 1.8263 | 6.486 | 6.573 |
| 65 | 0.9993 | 2.0810 | 2.1265 | 7.490 | 7.651 |
| 80 | 0.9947 | 2.5420 | 2.6224 | 9.150 | 9.439 |
| 95 | 0.9894 | 3.0358 | 3.1654 | 10.926 | 11.394 |
| 100 | ... | 3.208 | 3.342 | 11.52 | 12.01 |

LEAD CHLORIDE

SOLUBILITY OF LEAD CHLORIDE IN AQUEOUS SOLUTIONS OF HYDROCHLORIC ACID.

(At 0°, Engel — Ann. chim. phys. [6] 17, 359, '89; at 25°, Noyes — Z. physik. Chem. 9, 623, '92; at different temperatures, Ditté — Compt. rend. 92, 718, '81; see also Bell — J. Chem. Soc. 21, 350, '68.)

| Gms. HCl per Liter. | Gms. PbCl ₂ per Liter at: | | Gms. HCl per 100 Gms. H ₂ O. | Gms. PbCl ₂ per 100 Gms. Solution at: | | | | |
|---------------------------|---|-------|---|--|------|------|------|------|
| | 0°. | 25°. | | 0°. | 20°. | 40°. | 55°. | 80°. |
| 0 | 5.83 | 10.79 | 0 | 8.0 | 11.8 | 17.0 | 21.0 | 31.0 |
| 0.5 | 4.5 | 9.0 | 100 | 1.2 | 1.4 | 3.2 | 5.5 | 12.0 |
| 1.0 | 3.6 | 7.6 | 150 | 1.5 | 2.0 | 5.0 | 7.5 | 16.0 |
| 2.0 | 2.2 | 6.0 | 200 | 3.5 | 5.0 | 8.2 | 11.7 | 21.5 |
| 3.0 | 1.6 | 5.0 | 250 | 6.5 | 8.0 | 13.0 | 16.2 | 28.5 |
| 6 | 1.4 | 3.1 | 300 | 10.7 | 12.5 | 17.5 | 22.0 | 35.0 |
| 10 | 1.2 | 1.8 | 400 | 21.5 | 24.0 | ... | ... | ... |
| 100 | 1.2 | ... | | | | | | |
| 200 | 5.2 | ... | | | | | | |
| 250 | 10.5 | ... | | | | | | |
| 300 | 17.5 | ... | | | | | | |
| 400 | 40.0 | ... | | | | | | |

SOLUBILITY OF LEAD CHLORIDE IN AQUEOUS SALT SOLUTIONS
AT 25°.

(Noyes; in HgCl_2 solutions at 20° , Formanek — Chem. Centralb. 270, '87.)

In Aqueous Solutions of:

| HCl, KCl, MgCl ₂ , CaCl ₂ , MnCl ₂ , and ZnCl ₂ Gram Equivalents per Liter of: | | In CaCl ₂ Gram Equiv. per Liter. | | In HgCl ₂ Gram Equiv. per Liter. | | In Pb(NO ₃) ₂ Gram Equiv. per Liter. | |
|--|---------------------|---|---------------------|---|---------------------|---|---------------------|
| Salt. | PbCl ₂ . | CdCl ₂ . | PbCl ₂ . | HgCl ₂ . | PbCl ₂ . | Pb(NO ₃) ₂ . | PbCl ₂ . |
| 0.0 | 0.0777 | 0.00 | 0.0777 | 0.0 | 0.0777 | 0.0 | 0.0777 |
| 0.05 | 0.050 | 0.05 | 0.0601 | 0.1 | 0.0992 | 0.2 | 0.0832 |
| 0.10 | 0.035 | 0.10 | 0.0481 | | | | |
| 0.20 | 0.021 | 0.20 | 0.0355 | | | | |

The above results were calculated to grams per liter plotted on cross-section paper, and the figures in the following table read from the curves.

[illegible]

SOLUBILITY OF LEAD CHLORIDE IN GLYCERINE.

(Presse — Ber. 7, 599, '74.)

1 part glycerine + 7 parts H_2O dissolve 0.91 per cent $PbCl_2$.
 1 part glycerine + 3 parts H_2O dissolve 1.04 per cent $PbCl_2$.
 1 part glycerine + 1 part H_2O dissolves 1.32 per cent $PbCl_2$.
 Pure glycerine dissolves 2.00 per cent $PbCl_2$.

LEAD CHROMATE $PbCrO_4$.

One liter of water dissolves 0.0002 gram $PbCrO_4$ at 18° (conductivity method).
 (Kohlrausch — Z. physik. Chem. 50, 365, '04-'05.)

SOLUBILITY OF LEAD CHROMATE IN AQUEOUS POTASSIUM HYDROXIDE SOLUTIONS.

(Lacland and Lepierre — Bull. soc. chim. [3] 6, 230, '91.)

| t°. | Grams KOH per 100 cc. | Grams $PbCrO_4$ per 100 cc. |
|-----|-----------------------|-----------------------------|
| 15 | 2.308 | 1.19 |
| 60 | 2.308 | 1.62 |
| 80 | 2.308 | 2.61 |
| 102 | 2.308 | 3.85 |

LEAD CITRATE $Pb(C_6H_5O_7)_2 \cdot H_2O$.

SOLUBILITY IN WATER AND IN ALCOHOL.

100 gms. H_2O dissolve 0.04201 gm. $Pb(C_6H_5O_7)_2 \cdot H_2O$ at 18° , and 0.05344 gm. at 25° .

100 gms. alcohol (95%) dissolve 0.0156 gm. $Pb(C_6H_5O_7)_2 \cdot H_2O$ at 18° , and 0.0167 gm. at 25° .
 (Partheil and Hübner — Archiv. Pharm. 241, 413, '03.)

LEAD DOUBLE CYANIDES.

SOLUBILITY IN WATER.

(Schuler — Sitzber. Akad. Wiss. Wien, 79, 302, '79.)

| Double Salt. | Formula. | t°. | Gms. per 100 Gms. H_2O . |
|-------------------------------|--|-----|----------------------------|
| Lead Cobalticyanide | $Pb_2[Co(CN)_6]_2 \cdot 7H_2O$ | 18 | 56.5 |
| Lead Cobalticyanide | $Pb_2[Co(CN)_6]_2 \cdot 7H_2O$ | 19 | 61.3 |
| Lead Potassium Cobalticyanide | $PbKCo(CN)_6 \cdot 3H_2O$ | 18 | 14.8 |
| Lead Cobalticyanide Nitrate | $Pb_2[Co(CN)_6]_2 \cdot Pb(NO_3)_2 \cdot 12H_2O$ | 18 | 5.9 |
| Lead Ferricyanide Nitrate | $Pb_2[Fe(CN)_6]_2 \cdot Pb(NO_3)_2 \cdot 12H_2O$ | 16 | 7.5 |
| Lead Potassium Ferricyanide | $PbKFe(CN)_6 \cdot 3H_2O$ | 16 | 21.0 |

LEAD FLUORIDE PbF_2 .

One liter of water dissolves 0.64 gram PbF_2 at 18° (conductivity method).
 (Kohlrausch — Z. physik. Chem. 50, 365, '04-'05.)

LEAD FORMATE $Pb(HCOO)_2$.SOLUBILITY OF LEAD FORMATE IN AQUEOUS SOLUTIONS OF BARIUM FORMATE AT 25° .

(Fock — Z. Kryst. Min. 28, 383, '97.)

| Mol. % in Solution. | | Grams per Liter. | | Sp. Gr. of Solutions. | In Solid Phase Mol. % of | |
|---------------------|-----------------|------------------|-----------------|-----------------------|--------------------------|-----------------|
| $Pb(HCO_2)_2$. | $Ba(HCO_2)_2$. | $Pb(HCO_2)_2$. | $Ba(HCO_2)_2$. | | $Pb(HCO_2)_2$. | $Ba(HCO_2)_2$. |
| 0.00 | 100.0 | ... | 28.54 | 1.2204 | 0.0 | 100 |
| 0.29 | 99.71 | 1.104 | 28.65 | 1.2213 | 1.72 | 98.28 |
| 0.74 | 99.26 | 2.803 | 28.90 | 1.2251 | 5.29 | 94.71 |
| 1.24 | 98.76 | 5.309 | 32.24 | 1.2529 | 11.94 | 88.06 |
| 2.91 | 97.09 | 11.42 | 29.29 | 1.2341 | 24.81 | 75.19 |
| 5.92 | 94.08 | 23.11 | 28.13 | 1.2355 | 56.54 | 43.46 |
| 100.00 | 0.0 | 28.35 | ... | 1.0911 | 100.0 | 0.0 |

LEAD HYDROXIDE Pb(OH)_2 .

SOLUBILITY OF LEAD HYDROXIDE IN AQUEOUS SOLUTIONS OF SODIUM HYDROXIDE. (Moist Lead Hydroxide used, temperature not given.)

(Rubenbauer — Z. anorg. Chem. 30, 336, '02.)

| Amt. of Na in 20 cc. | Amt. of Pb. in 20 cc. | Mol. Dilution of NaOH. | Grams per 100 cc. Solution. | |
|-------------------------|--------------------------|---------------------------|-----------------------------|---------------------|
| | | | NaOH. | Pb(OH)_2 . |
| 0.2024 | 0.1012 | 2.27 | 1.759 | 0.590 |
| 0.3196 | 0.1736 | 1.44 | 2.778 | 1.010 |
| 0.5866 | 0.3532 | 0.785 | 5.10 | 2.056 |
| 0.9476 | 0.4071 | 0.485 | 8.235 | 2.370 |
| 1.7802 | 0.5170 | 0.258 | 15.470 | 3.010 |

LEAD IODATE $\text{Pb(IO}_3)_2$.

One liter of water dissolves 0.019 gm. $\text{Pb(IO}_3)_2$ at 18°.

(Kohlrausch; Böttger.)

LEAD IODIDE PbI_2 .

SOLUBILITY IN WATER.

(Lichty — J. Am. Chem. Soc. 25, 471, '03.)

| t°. | Density. (H_2O at 0°.) | Grams PbI_2 per 100 | | Millimols PbI_2 per 100 | |
|-----|--|------------------------------|------------------------------|----------------------------------|------------------------------|
| | | cc. Solution. | Grams H_2O . | cc. Solution. | Grams H_2O . |
| 0 | 1.0006 | 0.0442 | 0.0442 | 0.096 | 0.096 |
| 15 | 0.9998 | 0.0613 | 0.0613 | 0.133 | 0.133 |
| 25 | 0.9980 | 0.0762 | 0.0764 | 0.165 | 0.166 |
| 35 | 0.9951 | 0.1035 | 0.1042 | 0.224 | 0.226 |
| 45 | 0.9915 | 0.1440 | 0.1453 | 0.312 | 0.315 |
| 55 | 0.9872 | 0.1726 | 0.1755 | 0.374 | 0.381 |
| 65 | 0.9827 | 0.2140 | 0.2183 | 0.464 | 0.473 |
| 80 | 0.9745 | 0.2937 | 0.3023 | 0.637 | 0.656 |
| 95 | 0.9671 | 0.3814 | 0.3960 | 0.828 | 0.859 |
| 100 | ... | 0.420 | 0.436 | 0.895 | 0.927 |

SOLUBILITY OF LEAD IODIDE IN ACETONE, ANILIN AND AMYL ALCOHOL.

(von Laszczynski — Ber. 27, 2285, '94.)

| Solvent. | t°. | Grams PbI_2 per 100 Grams Solvent. |
|-----------------------------------|-------|---|
| $(\text{CH}_3)_2\text{CO}$ | 59 | 0.02 |
| $\text{C}_6\text{H}_5\text{NH}_2$ | 13 | 0.50 |
| $\text{C}_6\text{H}_5\text{NH}_2$ | 184 | 1.10 |
| $\text{C}_5\text{H}_7\text{OH}$ | 133.5 | 0.02 |

SOLUBILITY OF MIXTURES OF LEAD IODIDE AND POTASSIUM IODIDE IN WATER.

(Ditte — Ann. chim. phys. [5] 24, 226, '31; Schreinemaker — Z. physik. Chem. 9, 65, '92.)

| t°. | Grams per 1000 Gms. H ₂ O. | | Mols. per 1000 Mols. H ₂ O. | | Solid Phase. |
|-------|---------------------------------------|-------|--|---------------------------------|--------------------------------|
| | Pbl ₂ . | KI. | Pbl ₂ . | K ₂ I ₂ . | |
| 5 | ... | 163 | ... | 8.8 | Double Salt + Pbl ₂ |
| 20 | 9 | 260 | 0.3 | 14.1 | " " |
| 28 | 25 | 325 | 0.9 | 17.6 | " " |
| 39 | 45 | 449 | 1.8 | 24.3 | " " |
| 67 | 255 | 751 | 9.9 | 40.7 | " " |
| 80 | 731 | 1186 | 28.5 | 64.3 | " " |
| 80 | 519.9 | 976.4 | 22.2 | 52.9 | " " |
| 104.5 | 1411 | 1521 | 55.1 | 82.5 | " " |
| 120 | 2151 | 1812 | 83.9 | 98.2 | " " |
| 137 | 2874 | 2097 | 112.2 | 113.8 | " " |
| 175 | 5603 | 2947 | 218.7 | 159.9 | " " |
| 189 | ... | 3339 | ... | 181.0 | " " |
| 9 | 96.6 | 1352 | 3.77 | 73.3 | Double Salt + KI |
| 13 | 114.3 | 1384 | 4.46 | 75.05 | " " |
| 23 | 186.3 | 1510 | 7.27 | 81.08 | " " |
| 50 | 526.7 | 1906 | 20.56 | 103.3 | " " |
| 64 | 789.3 | 2161 | 30.8 | 117.2 | " " |
| 83.5 | 1108.6 | 2434 | 43.2 | 131.9 | " " |
| 92 | 1273 | 2566 | 49.7 | 139.3 | " " |
| 137 | 2382 | 3278 | 93.0 | 117.7 | " " |
| 165 | 4187 | 4227 | 163.4 | 229.1 | " " |
| 218 | 10303 | ... | 402.3 | ... | " " |
| 241 | 12803 | 7998 | 499.9 | 433.6 | " " |
| 242 | 12749 | ... | 497.8 | ... | " " |
| 250 | 15264 | ... | 596.0 | ... | " " |

| t°. | Gms. PbI ₂ .2KI per 1000 Gms. H ₂ O. | Mols. PbI ₂ .2KI per 1000 Mols. H ₂ O. | Solid Phase. |
|-----|--|--|--|
| 157 | 5218 | 141.07 | PbI ₂ .2KI.2½H ₂ O |
| 172 | 6489 | 175.5 | " |
| 186 | 7903 | 213.7 | " |
| 194 | 9266 | 250.6 | " |
| 201 | 11320 | 306.0 | " |

LEAD MALATE Pb.C₄H₄O₆.3H₂O.

SOLUBILITY IN WATER AND ALCOHOL.

(Partheil and Hübner — Archiv. Pharm. 241, 413, '03.)

100 gms. H₂O dissolve 0.0288 gm. PbC₄H₄O₆.3H₂O at 18°, and 0.06504 gm. at 25°.

100 gms. 95% alcohol dissolve 0.0048 gm. PbC₄H₄O₆.3H₂O at 18°-25°.

Density of alcohol employed = 0.8092.

LEAD NITRATE

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LEAD NITRATE $\text{Pb}(\text{NO}_3)_2$.

SOLUBILITY IN WATER.

(Mulder; Kremers — Pogg. Ann. 92, 497, '54; at 15°, Michel and Kraft — Ann. chim. phys. [3] 41, 471, '54; at 17°, Euler — Z. physik. Chem. 49, 314, '04.)

| t°. | Grams $\text{Pb}(\text{NO}_3)_2$ per 100 Gms. | | | t°. | Grams $\text{Pb}(\text{NO}_3)_2$ per 100 Gms. | | |
|-----|---|---------------------|----------------------|-----|---|-------|-----------|
| | Water. | | Solution. | | Water. | | Solution. |
| 0 | 36.5 ⁽¹⁾ | 38.8 ⁽²⁾ | 27.33 ⁽³⁾ | 40 | 69.4 | 75.0 | 41.9 |
| 10 | 44.4 | 48.3 | 31.6 | 50 | 78.7 | 85.0 | 45.0 |
| 17 | 50.0 | 54.0 | 34.2 | 60 | 88.0 | 95.0 | 47.8 |
| 20 | 52.3 | 56.5 | 35.2 | 80 | 107.6 | 115.0 | 52.7 |
| 25 | 56.4 | 60.6 | 36.9 | 100 | 127.0 | 138.8 | 57.1 |
| 30 | 60.7 | 66.0 | 38.8 | 17° | 52.76* | | 34.54* |

* Euler.

(1) Mulder, (2) Kremers, (3) Average of M and K.

Density of saturated solution at 17° = 1.405. (Euler.)

SOLUBILITY OF LEAD NITRATE IN ETHYL AND METHYL ALCOHOL.

| Solvent. | Gms. $\text{Pb}(\text{NO}_3)_2$ per 100 Grams Solvent at: | | | | |
|---|---|------|--------------|------|------------|
| | 4°. | 8°. | 22°. | 40°. | 50°. |
| Aq. $\text{C}_2\text{H}_5\text{OH}$ (Sp. Gr. .9282) | 4.96 | 5.82 | 8.77 | 12.8 | 14.9 (G) |
| Abs. $\text{C}_2\text{H}_5\text{OH}$ | ... | ... | 0.04 (20.5°) | ... | ... (de B) |
| Abs. CH_3OH | ... | ... | 1.37 | ... | ... |

(Gerardin — Ann. chim. phys. [4] 5, 129, '65; de Bruyn — Z. physik. Chem. 10, 783, '92.)

SOLUBILITY OF MIXED CRYSTALS OF LEAD NITRATE AND STRONTIUM NITRATE IN WATER AT 25°.

(Fock — Z. Kryst. Min. 28, 372, '97.)

| Mol. per cent in Solution. | | Gms. per 100 cc. Solution. | | Sp. Gr. of Solutions. | Mol. per cent in Solid Phase. | |
|------------------------------|------------------------------|------------------------------|------------------------------|-----------------------|-------------------------------|------------------------------|
| $\text{Pb}(\text{NO}_3)_2$. | $\text{Sr}(\text{NO}_3)_2$. | $\text{Pb}(\text{NO}_3)_2$. | $\text{Sr}(\text{NO}_3)_2$. | | $\text{Pb}(\text{NO}_3)_2$. | $\text{Sr}(\text{NO}_3)_2$. |
| 100 | 0.0 | 46.31 | 0.0 | 1.4472 | 100 | 0.0 |
| 87.41 | 12.39 | 50.47 | 4.56 | 1.4336 | 99.05 | 0.95 |
| 78.68 | 21.32 | 53.92 | 8.14 | 1.4288 | 98.11 | 1.89 |
| 56.39 | 43.61 | 45.34 | 17.81 | 1.4263 | 97.02 | 2.98 |
| 60.29 | 39.71 | 44.48 | 18.74 | 1.4245 | 96.06 | 3.94 |
| 33.70 | 66.30 | 25.23 | 35.03 | 1.4468 | 83.84 | 16.16 |
| 24.58 | 75.42 | 19.13 | 37.54 | 1.4867 | 32.88 | 67.12 |
| 0.0 | 100.0 | 0.0 | 71.04 | 1.5141 | 0.0 | 100.00 |

LEAD OXALATE PbC_2O_4 .

One liter of water dissolves 0.0015 gm. PbC_2O_4 at 18° (conductivity method). (Böttger — Z. physik. Chem. 46, 602, '03; Kohlrausch — *Ibid* 50, 356, '04-'05.)

LEAD OXIDES.

SOLUBILITY IN WATER.

(Böttger; Ruer — Z. anorg. Chem. 50, 273, '06.)

| No. | Description of Oxide. | Gm. Equiv. per Liter. | Gms. per Liter. |
|-----|--|-----------------------|-----------------|
| 1. | Yellow Oxide, by boiling Pb hydroxide with 10% NaOH | 1.03×10^{-4} | 0.023 |
| 2. | Red Oxide, by boiling Pb hydroxide with conc. NaOH | 0.56×10^{-4} | 0.012 |
| 3. | Yellow Oxide, by heating No. 1 to 630° | 1.05×10^{-4} | 0.023 |
| 4. | Yellow Oxide, by heating No. 2 to 740° | 1.00×10^{-4} | 0.022 |
| 5. | Yellow Oxide, by heating com. yellow brown oxide to 620° | 1.09×10^{-4} | 0.024 |
| 6. | Yellow Brown Oxide commercially pure | 1.10×10^{-4} | 0.024 |
| 7. | Yellow Brown Oxide, by long rubbing of No. 5. | 1.12×10^{-4} | 0.025 |

Böttger gives for three samples of lead oxide, 0.017, 0.021, and 0.013 gm. per liter respectively.

LEAD PALMITATE, LEAD STEARATE.

100 cc. absolute ether dissolve 0.0138 gm. palmitate and 0.0148 gm. stearate.

(Lidoff — Bull. soc. chim. [3] 10, 356, '93.)

LEAD PHOSPHATE (Ortho) $\text{Pb}_2(\text{PO}_4)_2$.

One liter of 4.97 per cent aqueous acetic acid solution dissolves 1.27 gms. $\text{Pb}_2(\text{PO}_4)_2$.

(Bertrand — Monit. Scient. [3] 10, 477, '68.)

LEAD SUCCINATE $\text{PbC}_4\text{H}_4\text{O}_4$.**SOLUBILITY IN WATER AND IN ALCOHOL.**

(Partheil and Hübner — Archiv. Pharm. 241, 413, '03.)

100 gms. H_2O dissolve 0.0253 gm. $\text{PbC}_4\text{H}_4\text{O}_4$ at 18° , and 0.0285 gm. at 25° .

100 gms. 95% alcohol dissolve 0.00275 gm. $\text{PbC}_4\text{H}_4\text{O}_4$ at 18° , and 0.003 gm. at 25° .

Density of alcohol used = 0.8092.

LEAD SULPHATE PbSO_4 .

One liter of water dissolves 0.041 gm. PbSO_4 , by conductivity method.

(Kohlrausch; Böttger. Dibbits — Z. anal. Chem. 13, 139, '74, finds 0.038 gram by gravimetric method.)

SOLUBILITY OF LEAD SULPHATE IN AQUEOUS SOLUTIONS OF STRONG ACIDS.

(Schultz — Pogg. Ann. 113, 137, '61; Rodwell — J. Chem. Soc. 15, 59, '62.)

| In Aq. H_2SO_4 . | | | In Aq. HCl . | | | In Aq. HNO_3 . | | |
|----------------------------------|------|-------|-----------------------|------|------|-------------------------|------|------|
| (a). | (b). | (c). | (a). | (b). | (c). | (a). | (b). | (c). |
| 1.540 | 63.4 | 0.003 | 1.05 | 10.6 | 0.14 | 1.08 | 11.6 | 0.33 |
| 1.793 | 85.7 | 0.011 | 1.08 | 16.3 | 0.35 | 1.12 | 17.5 | 0.59 |
| 1.841 | 97.0 | 0.039 | 1.11 | 22.0 | 0.95 | 1.25 | 34.0 | 0.78 |
| | | | 1.14 | 27.5 | 2.11 | 1.42 | 60.0 | 1.01 |
| | | | 1.16 | 31.6 | 2.86 | | | |

(a) Sp. Gr. of Aq. Acid. (b) Gms. Acid per 100 Gms. Solution. (c) Gms. PbSO_4 per 100 Gms. Solvent.

SOLUBILITY OF LEAD SULPHATE IN AQUEOUS SOLUTIONS OF AMMONIUM ACETATE AND OF SODIUM ACETATE.

(Noyes and Whitcomb — J. Am. Chem. Soc. 27, 756, '05; Dunnington and Long — Am. Ch. J. 22, 217, '99; Dibbits — Z. anal. Chem. 13, 139, '74.)

| In Ammonium Acetate. | | | | In Sodium Acetate. | | | |
|---|-------------------|---|-------------------|--|-------|--|-------------------|
| At 25° (N. and W.). | | | | At 100° (D. and L.). | | | |
| Millimols per Liter. | | Grams per Liter. | | G. $\text{NH}_4\text{C}_2\text{H}_3\text{O}_2$ per 100 cc. Solution. | | G. PbSO_4 per 100 g. Solution. | |
| $\text{NH}_4\text{C}_2\text{H}_3\text{O}_2$. | PbSO_4 . | $\text{NH}_4\text{C}_2\text{H}_3\text{O}_2$. | PbSO_4 . | | | Gms. per 100 Gms. H_2O . | |
| | | | | | | $\text{NaC}_2\text{H}_3\text{O}_2$. | PbSO_4 . |
| 0.0 | 0.134 | 0.0 | 0.041 | 28 | 7.12 | 2.05 | 0.054 |
| 103.5 | 2.10 | 7.98 | 0.636 | 32 | 9.88 | 8.2 | 0.853 |
| 207.1 | 4.55 | 15.96 | 1.38 | 37 | 10.58 | 41.0 | 11.23 |
| 414.1 | 10.10 | 31.92 | 3.02 | 45 | 11.10 | | |

LEAD (Hypo) SULPHATE 170

SOLUBILITY OF MIXTURES OF LEAD HYPOSULPHATE AND STRONTIUM HYPOSULPHATE AT 25°.

(Fock — Z. Kryst. Min. 28, 389, '97.)

| Mol. per cent in Solution. | | Grams per Liter. | | Sp. Gr. of Solutions. | Mol. per cent in Solid Phase. | |
|---|---|-----------------------------------|-----------------------------------|-----------------------|---|---|
| PbS ₂ O ₆ 4H ₂ O. | SrS ₂ O ₆ 4H ₂ O. | PbS ₂ O ₆ . | SrS ₂ O ₆ . | | PbS ₂ O ₆ 4H ₂ O. | SrS ₂ O ₆ 4H ₂ O. |
| 0.0 | 100.0 | 0.0 | 145.6 | 1.1126 | 0.0 | 100.0 |
| 1.05 | 98.95 | 2.97 | 151.2 | 1.1184 | 0.30 | 99.7 |
| 15.31 | 84.69 | 40.82 | 152.5 | 1.1503 | 3.87 | 96.13 |
| 46.80 | 53.20 | 149.2 | 114.5 | 1.2147 | 9.84 | 90.16 |
| 62.30 | 37.70 | 256.1 | 85.0 | 1.2889 | 19.26 | 80.74 |
| 75.75 | 24.25 | 310.3 | 67.0 | 1.3252 | 23.73 | 76.27 |
| 78.09 | 21.91 | 373.7 | 70.8 | 1.3726 | 32.24 | 67.76 |
| 88.29 | 11.71 | 509.5 | 45.6 | 1.4671 | 49.97 | 50.13 |
| 100.0 | 0.00 | 374.3 | 0.0 | 1.6817 | 0.00 | 0.00 |

LEAD TARTRATE PbC₄O₆H₄.

SOLUBILITY IN WATER.

(Cantoni and Zachoder — Bull. soc. chim. [3] 33, 751, '05; Partheil and Hübner — Archiv. Pharm. 241, 413, '03.)

| t°. | Gms. PbC ₄ O ₆ H ₄ per 100 cc. Solution. | t°. | Gms. PbC ₄ O ₆ H ₄ per 100 cc. Solution. | t°. | Gms. PbC ₄ O ₆ H ₄ per 100 cc. Solution. |
|-----|--|-----|--|-----|--|
| 18 | 0.010 (P. and H.) | 50 | 0.00225 | 70 | 0.0032 |
| 25 | 0.0108 " | 55 | 0.00295 | 75 | 0.0033 |
| 35 | 0.00105 | 60 | 0.00305 | 80 | 0.0038 |
| 40 | 0.0015 | 65 | 0.00315 | 85 | 0.0054 |

NOTE. — The positions of the decimal points here shown are just as given in the original communications.

100 gms. alcohol of 0.8092 Sp. Gr. (about 95%) dissolve 0.0028 gm. PbC₄O₆H₄ at 18°, and 0.00315 gm. at 25°.

(P. and H.)

LEVULOSE C₆H₁₂O₆.

100 gms. saturated solution in pyridine contain 18.49 gms. C₆H₁₂O₆ at 26°, Sp. Gr. 1.0521.

(Holty — J. Physic. Chem. 9, 764, '05.)

LIGRÖIN.

100 cc. H₂O dissolve 0.341 cc. ligröin at 22° Vol. of solution = 100.34, Sp. Gr. 0.9969.

100 cc. ligröin dissolve 0.335 cc. H₂O at 22° Vol. of solution = 100.60, Sp. Gr. 0.6640.

(Herz — Ber. 31, 2671, '08.)

LITHIUM BENZOATE C₆H₅COOLi.

100 gms. H₂O dissolve 33.3 gms. at 25°, and 40.0 gms. at b. pt.

100 gms. alcohol dissolve 7.7 gms. at 25°, and 10.0 gms. at b. pt.

(U. S. P.)

LITHIUM BORATE Li₂OB₂O₃.

SOLUBILITY IN WATER.

| t° | 0 | 10 | 20 | 30 | 40 | 45 |
|---|-----|-----|-----|-----|-------|----|
| Gms. Li ₂ OB ₂ O ₃ per 100 Gms. H ₂ O | 0.7 | 1.4 | 2.6 | 4.9 | 11.12 | 20 |

(Le Chatelier — Compt. rend. 124, 1004, '97.)

LITHIUM BROMATE LiBrO_3 .

100 gms. H_2O dissolve 153.7 gms. LiBrO_3 at 18° , or 100 gms. saturated solution contain 60.4 gms. Sp. Gr. of sol. = 1.833.

(Mylus and Funk — Ber. 30, 1718, '97.)

LITHIUM BROMIDE LiBr .

SOLUBILITY IN WATER.

(Kremers — Pogg. Ann. 104, 133, '58.)

| t°. | Gms. LiBr per 100 Gms. | | t°. | Gms. LiBr per 100 Gms. | |
|-----|------------------------|-----------|-----|------------------------|-----------|
| | Water. | Solution. | | Water. | Solution. |
| 0 | 143 | 58.8 | 40 | 202 | 66.9 |
| 10 | 161 | 61.7 | 50 | 214 | 68.2 |
| 20 | 177 | 63.9 | 60 | 224 | 69.1 |
| 25 | 184 | 64.8 | 80 | 245 | 71.0 |
| 30 | 190 | 65.5 | 100 | 266 | 72.7 |

100 gms. saturated solution in glycol, $\text{C}_2\text{H}_4(\text{OH})_2 \cdot \text{H}_2\text{O}$, contain 37.5 gms. LiBr at 14.7° .

(de Coninck — Chem. Centr. 76, II, 883, '05.)

LITHIUM CARBONATE Li_2CO_3 .

SOLUBILITY IN WATER.

(Bevade — J. russ. phys. chem. Ges. 16, 591, 84; Bull. soc. chim. [2] 43, 123, '85; Flückiger — Arch. Pharm. [3] 25, 542, '87; Draper — Chem. News, 55, 169, '87.)

An average curve was constructed from the available results and the following table read from it.

| t°. | Gms. Li_2CO_3 per 100 Gms. | | t°. | Gms. Li_2CO_3 per 100 Gms. | |
|-----|--|-----------|-----|--|-----------|
| | Water. | Solution. | | Water. | Solution. |
| 0 | 1.54 | 1.52 | 40 | 1.17 | 1.16 |
| 10 | 1.43 | 1.41 | 50 | 1.08 | 1.07 |
| 20 | 1.33 | 1.31 | 60 | 1.01 | 1.00 |
| 25 | 1.29 | 1.28 | 80 | 0.85 | 0.84 |
| 30 | 1.25 | 1.24 | 100 | 0.72 | 0.71 |

Density of saturated solution at 0° = 1.017; at 15° = 1.014.

SOLUBILITY OF LITHIUM CARBONATE IN AQUEOUS SOLUTIONS OF ALKALI SALTS AT 25° .

(Geffcken — Z. anorg. Chem. 43, 197, '05.)

The original results were calculated to gram quantities and plotted on cross-section paper. The figures in the following table were read from the curves.

| Gms. Salt per Liter. | Grams Li_2CO_3 per Liter in Aqueous Solutions of: | | | | | | | |
|----------------------|---|------------------|----------------|-----------------|---------------------------|----------------------------|--------------------------|--------------------------------|
| | KClO_3 . | KNO_3 . | KCl . | NaCl . | K_2SO_4 . | Na_2SO_4 . | NH_4Cl . | $(\text{NH}_4)_2\text{SO}_4$. |
| 0 | 12.63 | 12.63 | 12.63 | 12.63 | 12.63 | 12.63 | 12.63 | 12.63 |
| 10 | 12.95 | 13.05 | 13.10 | 13.4 | 13.9 | 14.0 | 16.0 | 20.7 |
| 20 | 13.10 | 13.3 | 13.5 | 13.9 | 14.7 | 15.0 | 19.2 | 25.0 |
| 30 | 13.25 | 13.6 | 13.8 | 14.3 | 15.4 | 16.0 | 21.5 | 28.2 |
| 40 | 13.40 | 13.8 | 14.0 | 14.6 | 16.0 | 16.6 | 23.3 | 30.8 |
| 60 | ... | 13.8 | 14.2 | 14.5 | 16.9 | 17.8 | 26.0 | 35.2 |
| 80 | ... | 13.6 | 14.0 | 14.4 | 17.7 | 18.6 | 27.6 | 38.5 |
| 100 | ... | 13.5 | 13.9 | 14.2 | 18.2 | 19.4 | 28.4 | 41.0 |
| 120 | ... | 13.3 | 13.7 | 14.0 | ... | 19.9 | 28.7 | 42.6 |
| 140 | ... | 13.0 | 13.3 | ... | ... | 20.4 | 28.8 | 43.5 |
| 170 | ... | 12.6 | ... | ... | ... | ... | 28.9 | ... |
| 200 | ... | 12.2 | ... | ... | ... | ... | 29.0 | ... |

100 gms. aq. alcohol of 0.941 Sp. Gr. dissolve 0.056 gm. Li_2CO_3 at 15.5° .

LITHIUM (Bi) CARBONATE 172**LITHIUM (Bi) CARBONATE** LiHCO_3 .

100 grams H_2O dissolve 5.501 grams LiHCO_3 at 13° .

(Bevade — Ber. 17, R 406, '84.)

LITHIUM CHLORATE LiClO_3 .

100 grams H_2O dissolve 213.5 grams LiClO_3 at 18° , or 100 grams sat. solution contain 75.8 grams. Sp. Gr. of sol. = 1.815.

(Mylius and Funk — Ber. 30, 1718, '97.)

LITHIUM CHLORAUATE LiAuCl_4 .

SOLUBILITY IN WATER.

(Roosenblatt — Ber. 19, 2538, '86.)

| t°. | Gms. LiAuCl_4 per 100 Gms. Solution. | t°. | Gms. LiAuCl_4 per 100 Gms. Solution. | t°. | Gms. LiAuCl_4 per 100 Gms. Solution. |
|-----|--|-----|--|-----|--|
| 10 | 53.1 | 40 | 67.3 | 60 | 76.4 |
| 20 | 57.7 | 50 | 72.0 | 70 | 81.0 |
| 30 | 62.5 | | | 80 | 85.7 |

LITHIUM CHLORIDE LiCl .

SOLUBILITY IN WATER.

(Average curve from results of Gerlach — Z. anal. Chem. 8, 281, '69.)

| t°. | Gms. LiCl per 100 Gms. | | t°. | Gms. LiCl per 100 Gms. | |
|-----|---------------------------------|-----------|-----|---------------------------------|-----------|
| | Water. | Solution. | | Water. | Solution. |
| 0 | 67 | 40.1 | 40 | 90.5 | 47.5 |
| 10 | 72 | 41.9 | 50 | 97.0 | 49.2 |
| 20 | 78.5 | 44.0 | 60 | 103.0 | 51.9 |
| 25 | 81.5 | 49.9 | 80 | 115.0 | 53.5 |
| 30 | 84.5 | 45.8 | 100 | 127.5 | 56.0 |

Density of saturated solution at 0° , 1.255; at 15° , 1.275.

SOLUBILITY OF LITHIUM CHLORIDE IN AQUEOUS SOLUTIONS OF HYDROCHLORIC ACID AT 0° .

(Engel — Ann. chim. phys. [6] 13, 385, '88.)

| Milligram Mols. per 10 cc. Solution. | | Gms. per 10 cc. Solution. | | Sp. Gr. of Solutions. |
|---|----------------|------------------------------|----------------|--------------------------|
| LiCl . | HCl . | LiCl . | HCl . | |
| 120 | 0.0 | 51.0 | 0.0 | 1.255 |
| 97.5 | 22.5 | 41.4 | 8.2 | 1.243 |
| 67.0 | 66.0 | 28.5 | 24.1 | 1.249 |
| 58.0 | 81.0 | 24.6 | 29.5 | 1.251 |

SOLUBILITY OF LITHIUM CHLORIDE IN SEVERAL SOLVENTS.

(von Laszczynski — Ber. 27, 2285, '94; de Coninck — Chem. Centr. 76, II, 883, '05.)

| In Acetone. (von L.) | | | | In Pyridine. (von L.) | | In Glycol. (de C.) | |
|-------------------------|--|-----|--|--------------------------|--|-----------------------|---|
| t°. | Gms. LiCl per 100 Gms. $(\text{CH}_3)_2\text{CO}$. | t°. | Gms. LiCl per 100 Gms. $(\text{CH}_3)_2\text{CO}$. | t°. | Gms. LiCl per 100 Gms. $\text{C}_5\text{H}_5\text{N}$. | t°. | Gms. LiCl per 100 Gms. Sat. Sol. |
| 0 | 4.60 | 46 | 3.76 | 15° | 7.78 | 15° | 11.0 |
| 12 | 4.41 | 53 | 3.12 | 100 | 14.26 | | |
| 25 | 4.11 | 58 | 2.14 | | | | |

LITHIUM CHROMATE $\text{Li}_2\text{CrO}_4 \cdot 2\text{H}_2\text{O}$.**LITHIUM BICHROMATE** $\text{Li}_2\text{Cr}_2\text{O}_7 \cdot 2\text{H}_2\text{O}$.

SOLUBILITY IN WATER AT 30°.

(Schreinemaker — Z. physik. Chem. 55, 79, '06; at 18°, Mylius and Funk — Ber. 30, 1718, '97.)

| Composition in Weight per cent: | | | | Solid Phase. |
|---------------------------------|----------------------|----------------------|----------------------|---|
| Of Solution. | | Of Residue. | | |
| % CrO ₃ . | % Li ₂ O. | % CrO ₃ . | % Li ₂ O. | |
| 0.0 | 7.09 | ... | ... | LiOH.H ₂ O |
| 6.986 | 7.744 | 4.322 | 18.538 | " |
| 16.564 | 8.888 | 10.089 | 19.556 | " |
| 25.811 | 10.611 | 15.479 | 21.106 | " |
| 33.618 | 12.886 | 24.365 | 19.398 | " |
| 37.411 | 14.306 | 44.555 | 17.411 | LiOH.H ₂ O + Li ₂ CrO ₄ .2H ₂ O |
| 37.588 | 14.381 | 36.331 | 18.552 | " " |
| 37.495 | 13.311 | 51.075 | 16.384 | Li ₂ CrO ₄ .2H ₂ O |
| 40.280 | 10.858 | ... | ... | " |
| 43.404 | 11.809 | 53.793 | 14.070 | Li ₂ Cr ₂ O ₇ .2H ₂ O + Li ₂ Cr ₂ O ₇ .2H ₂ O |
| 45.130 | 9.515 | 56.085 | 10.190 | Li ₂ Cr ₂ O ₇ .2H ₂ O |
| 47.945 | 7.951 | 58.029 | 9.238 | " |
| 57.031 | 6.432 | 65.560 | 8.733 | " |
| 67.731 | 5.713 | 71.687 | 8.513 | Li ₂ Cr ₂ O ₇ .2H ₂ O + CrO ₃ |
| 67.814 | 5.689 | 80.452 | 3.780 | " " |
| 65.200 | 4.661 | ... | ... | CrO ₃ |
| 63.257 | 2.141 | 85.914 | 0.758 | " |
| 62.28 | ... | ... | ... | " |

A saturated aqueous solution contains: .

49.985 per cent Li_2CrO_4 , or 100 grams H_2O dissolve 99.94 grams Li_2CrO_4 at 30° (S.).56.6 per cent $\text{Li}_2\text{Cr}_2\text{O}_7$, or 100 grams H_2O dissolve 130.4 grams $\text{Li}_2\text{Cr}_2\text{O}_7$ at 30° (S.).52.6 per cent Li_2CrO_4 , or 100 grams H_2O dissolve 110.9 grams LiCrO_4 at 18° (M. and F.).

Sp. Gr. of sat. solution at 18° = 1.574.

LITHIUM CITRATE $\text{C}_6\text{H}_4(\text{OH})(\text{COOLi})_3$.100 gms. H_2O dissolve 50 gms. citrate at 25°, and 66.6 gms. at b. pt.

100 gms. alcohol of 0.941 Sp. Gr. dissolve 4 gms. citrate at 15.5°.

(U. S. P.)

LITHIUM FLUORIDE LiF .100 grams H_2O dissolve 0.27 gram LiF at 18°. Sp. Gr. of sol. = 1.003.

(Mylius and Funk.)

LITHIUM FORMATE

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LITHIUM FORMATE HCOOLi.

SOLUBILITY IN WATER.

(Groschuff — Ber. 36, 179, '03.)

| t°. | Gms. HCOOLi per 100 Gms. Solution. | Mols. HCOOLi per 100 Mols. H ₂ O. | Solid Phase. | t°. | Gms. HCOOLi per 100 Gms. H ₂ O. | Mols. HCOOLi per 100 Mols. H ₂ O. | Solid Phase. |
|------|--|--|-------------------------|-----|--|--|-------------------------|
| -20 | 21.14 | 9.28 | HCOOLi.H ₂ O | 91 | 54.16 | 40.90 | HCOOLi.H ₂ O |
| 0 | 24.42 | 11.18 | " | 98 | 57.05 | 45.99 | HCOOLi |
| 18 | 27.85 | 13.36 | " | 104 | 57.04 | 47.11 | " |
| 49.5 | 35.60 | 19.14 | " | 120 | 59.63 | 51.13 | " |
| 74 | 44.91 | 28.22 | " | | | | |

Sp. Gr. sat. sol. at 18° = 1.142.

SOLUBILITY OF NEUTRAL LITHIUM FORMATE IN ANHYDROUS FORMIC ACID.

| t°. | Gms. per 100 Gms. Solution. HCOOLi. | Gms. per 100 Gms. Solution. HCOOH. | Mols. per 100 Mols. H ₂ O. HCOOLi. | Mols. per 100 Mols. H ₂ O. HCOOH. | Solid Phase. |
|-----|--|---------------------------------------|--|---|-----------------|
| 0 | 25.4 | 47.02 | 11.80 | 39.27 | HCOOLi |
| 18 | 25.9 | 46.92 | 12.11 | 39.11 | " |
| 39 | 26.4 | 46.92 | 12.42 | 39.13 | " |
| 60 | 26.9 | 46.94 | 12.74 | 39.13 | " |
| 79 | 27.8 | 47.02 | 13.36 | 39.26 | " |

LITHIUM HYDROXIDE LiOH.

SOLUBILITY IN WATER.

(Dittmar — J. Soc. Ch. Ind. 7, 730, '88; Pickering — J. Chem. Soc. 63, 909, '03.)

| t° | Gms. per 100 Gms. Solution. | | Gms. LiOH per 100 Gms. H ₂ O. | t°. | Gms. per 100 Gms. Solution. | | Gms. LiOH. per 100 Gms H ₂ O. |
|----|-----------------------------|-------|--|-----|-----------------------------|-------|--|
| | Li ₂ O. | LiOH. | | | Li ₂ O. | LiOH. | |
| 0 | 6.67 | 10.64 | 12.7 | 40 | 7.29 | 11.68 | 13.0 |
| 10 | 6.74 | 10.80 | 12.7 | 50 | 7.56 | 12.12 | 13.3 |
| 20 | 6.86 | 10.99 | 12.8 | 60 | 7.96 | 12.76 | 13.8 |
| 25 | 6.95 | 11.14 | 12.9 | 80 | 8.87 | 14.21 | 15.3 |
| 30 | 7.05 | 11.27 | 12.9 | 100 | 10.02 | 16.05 | 17.5 |

LITHIUM IODATE Li(IO₃).

100 grams H₂O dissolve 80.3 grams LiIO₃ at 18°, or 100 grams solution contain 44.6 grams. Sp. Gr. of sol. = 1.568.

(Mylus and Funk — Ber. 30, 1718, '97.)

LITHIUM IODIDE LiI.**SOLUBILITY IN WATER.**

(Kremers—Pogg. Ann. 104, 133, '58; 111, 60, '60.)

| t°. | Gms. LiI per 100 Gms. | | t°. | Grams LiI per 100 Gms. | |
|-----|-----------------------|-----------|-----|------------------------|-----------|
| | Water. | Solution. | | Water. | Solution. |
| 0 | 151 | 60.2 | 40 | 179 | 64.2 |
| 10 | 157 | 61.1 | 50 | 187 | 65.2 |
| 20 | 165 | 62.2 | 60 | 202 | 66.9 |
| 25 | 167 | 62.6 | 70 | 230 | 69.7 |
| 30 | 171 | 63.1 | 75 | 263 | 72.5 |

100 grams sat. solution in Glycol ($C_2H_4(OH)_2 \cdot H_2O$) contain 28.0 grams LiI at 15.3°.

(de Coninck—Chem. Centr. 76, II, 883, '05.)

100 cc. saturated solution in Furfural ($C_4H_3O \cdot COH$) contain 45.86 gms. LiI at 25°.

100 cc. saturated solution in Nitro Methane (CH_3NO_2) contain 1.219 gms. LiI at 0°, and 2.519 gms. at 25°.

(Walden—Z. physik. Ch. 55, 713, 718, '06.)

LITHIUM NITRATE $LiNO_3$.**SOLUBILITY IN WATER.**

(Donnan and Burt—J. Chem. Soc. 83, 335, '05.)

| t°. | Gms. $LiNO_3$ per 100 Gms. Solution. | | t°. | Gms. $LiNO_3$ per 100 Gms. Solution. | |
|-------|--------------------------------------|----------------------|-------|--------------------------------------|--------------------------------|
| | | Solid Phase. | | | Solid Phase. |
| 0.1 | 34.8 | $LiNO_3 \cdot 3H_2O$ | 29.87 | 56.42 | $LiNO_3 \cdot 3H_2O$ |
| 10.5 | 37.9 | " | 29.86 | 56.68 | " |
| 12.1 | 38.2 | " | 29.64 | 57.48 | " |
| 13.75 | 39.3 | " | 29.55 | 58.03 | " |
| 19.05 | 40.4 | " | 43.6 | 60.8 | $LiNO_3 \cdot \frac{1}{2}H_2O$ |
| 21.1 | 42.9 | " | 50.5 | 61.3 | " |
| 27.55 | 47.3 | " | 55.0 | 63.0 | " |
| 29.47 | 53.67 | " | 60.0 | 63.6 | " |
| 29.78 | 55.09 | " | 64.2 | 64.9 | $LiNO_3$ |
| | | | 70.9 | 66.1 | " |

Cryohydrate point of the trihydrate, 17.8°. Transition points, 29.6° and 61.1°.

LITHIUM OXALATE $Li_2C_2O_4$.**SOLUBILITY OF MIXTURES OF LITHIUM OXALATE AND OXALIC ACID IN WATER AT 25°.**

(Foote and Andrew—Am. Ch. J. 34, 153, '05.)

Mixtures of the two substances were dissolved in water, and the solutions cooled in a thermostat to 25°.

| Gms. per 100 Gms. Solution. | | Mols. per 100 Mols. H_2O . | | Solid Phase. |
|-----------------------------|----------------|------------------------------|----------------|--|
| $H_2C_2O_4$. | $Li_2C_2O_4$. | $H_2C_2O_4$. | $Li_2C_2O_4$. | |
| 10.20 | ... | 2.274 | ... | $H_2C_2O_4 \cdot 2H_2O$ |
| 10.66 | 2.96 | 2.457 | 0.622 | $H_2C_2O_4 \cdot H_2O$ and $HLiC_2O_4 \cdot H_2O$ |
| 10.55 | 3.11 | | | |
| 8.08 | 3.18 | 1.823 | 0.633 | Double Salt $HLiC_2O_4 \cdot \frac{1}{2}H_2O$ = 39.2 $H_2C_2O_4$ and 44.7 $Li_2C_2O_4$ |
| 2.60 | 5.03 | 0.563 | 0.962 | |
| 2.16 | 6.54 | 0.469 | 1.273 | $HLiC_2O_4 \cdot H_2O$ and $Li_2C_2O_4$ |
| 2.12 | 1.61 | | | |
| ... | 5.87 | ... | 1.901 | $Li_2C_2O_4$ |

LITHIUM PHOSPHATE

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LITHIUM PHOSPHATE Li_3PO_4 .

100 grams H_2O dissolve 0.04 gram Li_3PO_4 . (Mayer — Liebig's Ann. 98, 193, '56)

LITHIUM (Hypo) PHOSPHATE $\text{Li}_4\text{P}_2\text{O}_6 \cdot 7\text{H}_2\text{O}$.

100 grams H_2O dissolve 0.83 gram hypophosphate at ord. temp.

(Rammelsberg — J. pr. Ch. [2] 45, 153, '92.)

LITHIUM PERMANGANATE $\text{LiMnO}_4 \cdot 3\text{H}_2\text{O}$.

100 grams water dissolve 71.4 grams permanganate at 16°.

(Ashoff.)

LITHIUM SALTS of Fatty Acids.

SOLUBILITY IN WATER AND IN ALCOHOL OF 0.797 SP. GR. AT 18°
AND AT 25°.

(Partheil and Ferie — Archiv. Pharm. 241, 554, '03.)

| Salt. | Formula. | Grams Salt per 100 cc. Sat. Solution in: | | | |
|-----------|--|--|--------|------------|--------|
| | | Water at | | Alcohol at | |
| | | 18°. | 25°. | 18°. | 25°. |
| Stearate | $\text{C}_{17}\text{H}_{35}\text{COOLi}$ | 0.010 | 0.011 | 0.041 | 0.0532 |
| Palmitate | $\text{C}_{16}\text{H}_{31}\text{COOLi}$ | 0.011 | 0.018 | 0.0796 | 0.0956 |
| Myristate | $\text{C}_{13}\text{H}_{27}\text{COOLi}$ | 0.0232 | 0.0234 | 0.184 | 0.2100 |
| Laurinate | $\text{C}_{11}\text{H}_{23}\text{COOLi}$ | 0.158 | 0.1726 | 0.418 | 0.4424 |
| Oleate | $\text{C}_{17}\text{H}_{33}\text{COOLi}$ | 0.0674 | 0.1320 | 0.9084 | 1.010 |

LITHIUM SULPHATE Li_2SO_4 .

SOLUBILITY IN WATER.

(Average curve from Kremers — Pogg. Ann. 95, 468, '55; Etard — Ann. chim. phys. [7] 2, 547, '04.)

| t°. | Gms. Li_2SO_4 per 100 Gms. Solution. | t°. | Gms. Li_2SO_4 per 100 Gms. Solution. | t°. | Gms. Li_2SO_4 per 100 Gms. Solution. |
|-----|--|-----|--|-----|--|
| -20 | 18.4 | 20 | 25.5 | 50 | 24.5 |
| -10 | 24.2 | 25 | 25.3 | 60 | 24.2 |
| 0 | 26.1 | 30 | 25.1 | 80 | 23.5 |
| 10 | 25.9 | 40 | 24.7 | 100 | 23.0 |

NOTE. — For equilibrium between lithium sulphate ammonia and water, see Schreinemaker and Cochart — Chem. Weekblad. 2, 771; 3, 157, '06.

EQUILIBRIUM BETWEEN LITHIUM SULPHATE, ALUMINUM SULPHATE, AND WATER AT 30°.

(Schreinemaker and De Waal — Chem. Weekblad. 3, 539, '06.)

| Composition in Weight per cent: | | | | Solid Phase. |
|---------------------------------|----------------------------------|------------------------------|----------------------------------|---|
| Of Solution. | | Of Residue. | | |
| % Li_2SO_4 . | % $\text{Al}_2(\text{SO}_4)_3$. | % Li_2SO_4 . | % $\text{Al}_2(\text{SO}_4)_3$. | |
| 25.1 | 0 | ... | ... | $\text{Li}_2\text{SO}_4 \cdot \text{H}_2\text{O}$ |
| 21.93 | 5.34 | ... | ... | " |
| 16.10 | 14.89 | 63.70 | 4.02 | " |
| 13.63 | 20.76 | 14.72 | 31.17 | { $\text{Li}_2\text{SO}_4 \cdot \text{H}_2\text{O} + \text{Al}_2(\text{SO}_4)_3 \cdot 18\text{H}_2\text{O}$ |
| 13.24 | 21.71 | 61.24 | 7.22 | |
| 11.73 | 22.08 | 6.92 | 33.54 | $\text{Li}_2\text{SO}_4 \cdot 4\text{H}_2\text{O}$ |
| 6.75 | 24.34 | 3.77 | 37.06 | $\text{Al}_2(\text{SO}_4)_3 \cdot 18\text{H}_2\text{O}$ |
| 3.44 | 26.12 | ... | ... | " |
| 0.0 | 28.0 | ... | ... | " |

NOTE. — For solubility of lithium sulphate in mixtures of alcohol and water at 30°, see Schreinemaker and Van Dorp, Jr. — Chem. Weekblad. 3, 557, '06.

MAGNESIUM BROMATE $\text{Mg}(\text{BrO}_3)_2 \cdot 6\text{H}_2\text{O}$.

100 cc. sat. solution contain 42 grams $\text{Mg}(\text{BrO}_3)_2$, or 0.15 gram mols. at 18°.

(Kohlrausch — Sitzb. K. Akad. Wiss. (Berlin), i, 90, '97.)

MAGNESIUM BROMIDE $\text{MgBr}_2 \cdot 6\text{H}_2\text{O}$.

SOLUBILITY IN WATER.

(Menschutkin — Chem. Centr. 77, I, 646, '06; at 18°, Mylius and Funk — Ber. 30, 1718, '97.)

| t°. | Grams MgBr_2 per 100 Gms. | | t°. | Grams MgBr_2 per 100 Grams. | |
|-----|------------------------------------|-------------------|-----|--------------------------------------|--------|
| | Solution. | Water. | | Solution. | Water. |
| -10 | 47.2 | 89.4 | 40 | 50.4 | 101.6 |
| 0 | 47.9 | 91.9 | 50 | 51.0 | 104.1 |
| 10 | 48.6 | 94.5 | 60 | 51.8 | 107.5 |
| 18 | 49.0 | 96.1 | 80 | 53.2 | 113.7 |
| 18 | 50.8 | 103.4 (M. and F.) | 100 | 54.6 | 120.2 |
| 20 | 49.1 | 96.5 | 120 | 56.0 | 127.5 |
| 25 | 49.4 | 97.6 | 140 | 58.0 | 138.1 |
| 30 | 49.8 | 99.2 | 160 | 62.0 | 163.1 |

Density of saturated solution at 18° = 1.655 (M. and F.)

Etard — Ann. chim. phys. [7] 2, 541, '94, gives solubility results which are evidently too high.

SOLUBILITY OF MAGNESIUM BROMIDE ALCOHOL COMPOUNDS IN WATER AND IN THE CORRESPONDING ALCOHOLS.

(Menschutkin — Chem. Centr. 77, I, 334, '06.)

In Water (Read from Curve.)

In the Corresponding Alcohols.

| Results in Grams per 100 Gms. Solution. | | | | Results Expressed in Mols. per cent. | | | |
|---|---|-----|--|--------------------------------------|--|-----|--|
| t°. | $\text{MgBr}_2 \cdot 6\text{CH}_3\text{OH}$. | t°. | $\text{MgBr}_2 \cdot 6\text{C}_2\text{H}_5\text{OH}$. | t°. | $\text{MgBr}_2 \cdot 6\text{CH}_3\text{OH}$ in CH_3OH . | t°. | $\text{MgBr}_2 \cdot 6\text{C}_2\text{H}_5\text{OH}$ in $\text{C}_2\text{H}_5\text{OH}$. |
| 0 | 6.0 | 0 | 3.0 | 0 | 6.0 | 0 | 2.0 |
| 50 | 7.5 | 40 | 5.0 | 20 | 6.4 | 20 | 4.6 |
| 100 | 10.0 | 50 | 12.0 | 40 | 6.9 | 40 | 8.4 |
| 140 | 15.0 | 60 | 15.0 | 50 | 7.2 | 50 | 10.9 |
| 160 | 20.0 | 80 | 22.0 | 60 | 7.5 | 60 | 14.1 |
| 170 | 25.0 | 90 | 24.0 | 80 | 8.25 | 80 | 22.1 |
| 180 | 33.0 | 100 | 40.0 | 100 | 9.6 | 100 | 38.6 |
| 185 | 40.0 | 105 | 60.0 | 150 | 16.7 | 150 | 100.0 (108.5°) |
| 190 | 80-100 | 108 | 100.0 | 190 | 100.0 | | |

Determinations are also given for the solubility of $\text{MgBr}_2 \cdot 6\text{C}_2\text{H}_5\text{OH}$ in $\text{C}_2\text{H}_5\text{OH}$, of $\text{MgBr}_2 \cdot 6(\text{CH}_3)_2\text{C}_2\text{H}_5\text{OH}$ in $(\text{CH}_3)_2\text{C}_2\text{H}_5\text{OH}$, and of $\text{MgBr}_2 \cdot 6(\text{CH}_3)_2\text{C}_2\text{H}_5\text{OH}$ in $(\text{CH}_3)_2\text{C}_2\text{H}_5\text{OH}$, also of $\text{MgBr}_2 \cdot 4(\text{CH}_3)_2\text{CHOH}$ in iso propyl alcohol and in tri methyl carbinol.

For the solubility magnesium bromide mono etherate ($\text{MgBr}_2 \cdot (\text{C}_2\text{H}_5)_2\text{O}$) in ethyl ether, see Menschutkin — Chem. Centr. 77, I, 1868, '06; also Z. anorg. Ch. 49, 208, '06. For magnesium bromide di etherate ($\text{MgBr}_2 \cdot 2\text{C}_4\text{H}_{10}\text{O}$) in ethyl ether, see Menschutkin — Z. anorg. Ch. 49, 35, '06. For magnesium bromide hexa formic acid and magnesium bromide hexa acetic acid compounds in aqueous solutions of the corresponding acids, see Isvietja d. Petersburger, Polytechn. Inst. 5, 293, '06; Chem. Centr. 77, II, 1482, '06.

MAGNESIUM CARBONATE 178

MAGNESIUM CARBONATE MgCO_3 .

SOLUBILITY IN WATER IN PRESENCE OF CARBON DIOXIDE AT 15° .

(Treadwell and Reuter — Z. anorg. Ch. 17, 200, '98.)

| cc. CO_2 per 100 cc. Gas Phase (at 0° and 760 mm.). | Partial Pressure of CO_2 in mm. Hg. | Grams per 100 cc. Solution. | | | |
|---|--|-----------------------------|-------------------|-------------------------------|-----------|
| | | Free CO_2 . | MgCO_3 . | $\text{Mg}(\text{HCO}_3)_2$. | Total Mg. |
| 18.85 | 143.3 | 0.1190 | ... | 1.2105 | 0.2016 |
| 5.47 | 41.6 | 0.0866 | ... | 1.2105 | 0.2016 |
| 4.47 | 33.8 | 0.0035 | ... | 1.2105 | 0.2016 |
| 1.54 | 11.7 | ... | 0.0773 | 1.0766 | 0.2016 |
| 1.35 | 10.3 | ... | 0.0765 | 0.7629 | 0.1492 |
| 1.07 | 8.2 | ... | 0.0807 | 0.5952 | 0.1224 |
| 0.62 | 4.7 | ... | 0.0701 | 0.3663 | 0.0865 |
| 0.60 | 4.6 | ... | 0.0758 | 0.3417 | 0.0788 |
| 0.33 | 2.5 | ... | 0.0748 | 0.2632 | 0.0655 |
| 0.21 | 1.6 | ... | 0.0771 | 0.2229 | 0.0594 |
| 0.14 | 1.1 | ... | 0.0710 | 0.2169 | 0.0566 |
| 0.03 | 0.3 | ... | 0.0711 | 0.2036 | 0.0545 |
| ... | ... | ... | 0.0685 | 0.2033 | 0.0536 |
| ... | ... | ... | 0.0702 | 0.1960 | 0.0529 |
| ... | ... | ... | 0.0625 | 0.2036 | 0.0520 |
| ... | ... | ... | 0.0616 | 0.1954 | 0.0511 |
| ... | ... | ... | 0.0641 | 0.1954 | 0.0518 |

Therefore at 0 partial pressure of CO_2 and at 15° and mean barometric pressure, one liter of saturated aqueous solution contains 0.641 gram of MgCO_3 plus 1.954 grams $\text{Mg}(\text{HCO}_3)_2$.

SOLUBILITY OF MAGNESIUM CARBONATE IN WATER CHARGED WITH CARBON DIOXIDE AT PRESSURES GREATER THAN ONE ATMOSPHERE.

(Engel and Ville — Compt. rend. 93, 340, '81; Engel — Ann. chim. phys. [6] 13, 349, '88.)

| Pressure of CO_2 in Atmospheres. | G. MgCO_3^* per Liter. | | Pressure of CO_2 in Atmospheres. | G. MgCO_3^* per Liter. | |
|---|---------------------------------|-----------------|---|---------------------------------|-----------------|
| | At 12° . | At 19° . | | At 12° . | At 19° . |
| 0.5 | 20.5 | ... | 4.0 | 42.8 | ... |
| 1.0 | 26.5 | 25.8 | 4.7 | ... | 43.5 |
| 2.0 | 34.2 | 33.1 (2.1 At.) | 6.0 | 50.6 | 48.5 (6.2 At.) |
| 3.0 | 39.0 | 37.2 (3.2 At.) | 9.0 | ... | 56.6 |

SOLUBILITY IN WATER SATURATED WITH CO_2 AT ONE ATMOSPHERE.

(Engel.)

| t° . | Gms. MgCO_3^* per Liter. | t° . | Gms. MgCO_3^* per Liter. | t° . | Gms. MgCO_3^* per Liter. |
|-------------|--------------------------------------|-------------|--------------------------------------|-------------|--------------------------------------|
| 5 | 36 | 30 | 21 | 60 | 11 |
| 10 | 31 | 40 | 17 | 80 | 5 |
| 20 | 26 | | | 100 | 0 |

* Dissolved as $\text{Mg}(\text{HCO}_3)_2$.

SOLUBILITY OF MAGNESIUM CARBONATE IN AQUEOUS SOLUTIONS OF SODIUM CARBONATE AT 25°. The solutions being in equilibrium with an atmosphere free from CO₂.

(Cameron and Seidell—J. Physic. Ch. 7, 588, '03.)

| Wt. of 1 Liter of Solution. | Grams per Liter. | | Reacting Weights per Liter. | |
|--------------------------------|-----------------------------------|---------------------|-----------------------------------|---------------------|
| | Na ₂ CO ₃ . | MgCO ₃ . | Na ₂ CO ₃ . | MgCO ₃ . |
| 996.8 | 0.00 | 0.223 | 0.000 | 0.00266 |
| 1019.9 | 23.12 | 0.288 | 0.220 | 0.00344 |
| 1047.7 | 50.75 | 0.510 | 0.482 | 0.00620 |
| 1082.5 | 86.42 | 0.879 | 0.820 | 0.01027 |
| 1118.9 | 127.3 | 1.314 | 1.209 | 0.01570 |
| 1147.7 | 160.8 | 1.636 | 1.526 | 0.01955 |
| 1166.1 | 181.9 | 1.972 | 1.727 | 0.02357 |
| 1189.4 | 213.2 | 2.317 | 2.024 | 0.02770 |

SOLUBILITY OF MAGNESIUM BI CARBONATE AND OF MAGNESIUM CARBONATE IN AQUEOUS SOLUTIONS OF SODIUM CHLORIDE AT 23°. The solutions being in equilibrium with an atmosphere of CO₂ in the one case, and in equilibrium with air free from CO₂ in the other.

(C. and S.)

| In Presence of CO ₂ as Gas Phase. | | Wt. of 1 Liter. | In Presence of Air Free from CO ₂ . | |
|--|---|--------------------|--|--------------------------------------|
| Gms. NaCl per Liter. | Gms. Mg(HCO ₃) ₂ per Liter. | | Gms. NaCl per Liter. | Gms. MgCO ₃ per Liter. |
| 7.0 | 30.64 | 996.9 | 0.0 | 0.176 |
| 56.5 | 30.18 | 1016.8 | 28.0 | 0.418 |
| 119.7 | 27.88 | 1041.1 | 59.5 | 0.527 |
| 163.9 | 24.96 | 1070.5 | 106.3 | 0.585 |
| 224.8 | 20.78 | 1094.5 | 147.4 | 0.544 |
| 306.6 | 10.75 | 1142.5 | 231.1 | 0.460 |
| | | 1170.1 | 272.9 | 0.393 |
| | | 1199.3 | 331.4 | 0.293 |

SOLUBILITY OF MAGNESIUM CARBONATE IN AQUEOUS SOLUTIONS OF SODIUM SULPHATE AT 24° AND AT 35.5°. The solutions being in equilibrium with an atmosphere free from CO₂.

(Cameron and Seidell.)

Results at 24°.

| Wt. of 1 Liter. | Gms. Na ₂ SO ₄ per Liter. | Gms. MgCO ₃ per Liter. |
|--------------------|--|--------------------------------------|
| 997.5 | 0.00 | 0.216 |
| 1021.2 | 25.12 | 0.586 |
| 1047.6 | 54.76 | 0.828 |
| 1080.9 | 95.68 | 1.020 |
| 1133.8 | 160.8 | 1.230 |
| 1157.3 | 191.9 | 1.280 |
| 1206.0 | 254.6 | 1.338 |
| 1242.0 | 305.1 | 1.388 |

Results at 35.5°.

| Wt. of 1 Liter. | Gms. Na ₂ SO ₄ per Liter. | Gms. MgCO ₃ per Liter. |
|--------------------|--|--------------------------------------|
| 995.1 | 0.32 | 0.131 |
| 1032.9 | 41.84 | 0.577 |
| 1067.2 | 81.84 | 0.753 |
| 1094.8 | 116.56 | 0.904 |
| 1120.4 | 148.56 | 0.962 |
| 1151.7 | 186.7 | 1.047 |
| 1179.8 | 224.0 | 1.088 |
| 1236.5 | 299.2 | 1.130 |

MAGNESIUM CHLORATE 180

MAGNESIUM CHLORATE $\text{Mg}(\text{ClO}_3)_2$.

SOLUBILITY IN WATER.

(Meusser — Ber. 35, 1416, '02.)

| t°. | Gms. $\text{Mg}(\text{ClO}_3)_2$ per 100 Gms. Solution. | Mols. $\text{Mg}(\text{ClO}_3)_2$ per 100 Mols. H_2O . | Solid Phase. | t°. | Gms. $\text{Mg}(\text{ClO}_3)_2$ per 100 Gms. Solution. | Mols. $\text{Mg}(\text{ClO}_3)_2$ per 100 Mols. H_2O . | Solid. Phase. |
|-----|--|---|---|------|--|---|---|
| -18 | 51.64 | 10.05 | $\text{Mg}(\text{ClO}_3)_2 \cdot 6\text{H}_2\text{O}$ | 42 | 63.82 | 16.16 | $\text{Mg}(\text{ClO}_3)_2 \cdot 4\text{H}_2\text{O}$ |
| 0 | 53.27 | 10.73 | " | 65.5 | 69.12 | 20.08 | " |
| 18 | 56.50 | 12.22 | " | 39.5 | 65.37 | 17.76 | $\text{Mg}(\text{ClO}_3)_2 \cdot 3\text{H}_2\text{O}$ |
| 29 | 60.23 | 14.25 | " | 61.0 | 69.46 | 21.40 | " |
| 35 | 63.65 | 16.48 | " | 68 | 70.69 | 22.69 | " |
| | | | | 93 | (73.71) | (26.38) | " |

Sp. Gr. of saturated sol. at + 18° = 1.564.

MAGNESIUM CHLORIDE MgCl_2 .

SOLUBILITY IN WATER.

(van 't Hoff and Meyerhoffer — Z. physik. Chem. 27, 75, '98; Engel; Lowenherz. Results quoted from Landolt and Börnstein — Tabellen, 3d, ed. p. 549, '06.)

| t°. | Gms. MgCl_2 per 100 Gms Solution. | Gms Water. | Solid Phase. | t°. | Gms. MgCl_2 per 100 Gms Solution. | Gms Water. | Solid Phase. |
|-------|---|---------------|--|-------|---|---------------|--|
| -10 | 11.1 | 12.5 | Ice | 0 | 34.5 | 52.8 | $\text{MgCl}_2 \cdot 6\text{H}_2\text{O}$ |
| -20 | 16.0 | 19.0 | " | 10 | 34.9 | 53.5 | " |
| -30 | 19.4 | 24.0 | " | 20 | 35.3 | 54.5 | " |
| -33.6 | 20.6 | 26.0 | Ice + $\text{MgCl}_2 \cdot 12\text{H}_2\text{O}$ | 22 | 35.6 | 55.2 | " |
| -12 | 26.7 | 36.5 | $\text{MgCl}_2 \cdot 12\text{H}_2\text{O}$ | 25 | 36.2 | 56.7 | " |
| -16.4 | 30.6 | 44.04 f. pt. | " | 40 | 36.5 | 57.5 | " |
| -16.8 | 31.6 | 46.2 | $\text{MgCl}_2 \cdot 12\text{H}_2\text{O} +$ $\text{MgCl}_2 \cdot 8\text{H}_2\text{O} \alpha$ | 60 | 37.9 | 61.0 | " |
| -17.4 | 32.3 | 47.6 | $\text{MgCl}_2 \cdot 12\text{H}_2\text{O} +$ $\text{MgCl}_2 \cdot 8\text{H}_2\text{O} \beta$ | 80 | 39.8 | 66.0 | " |
| -19.4 | 33.3 | 49.9 | $\text{MgCl}_2 \cdot 12\text{H}_2\text{O} +$ $\text{MgCl}_2 \cdot 6\text{H}_2\text{O} \beta$ | 100 | 42.2 | 73.0 | " |
| -9.6 | 33.9 | 51.3 | $\text{MgCl}_2 \cdot 8\text{H}_2\text{O} \beta$ + $\text{MgCl}_2 \cdot 6\text{H}_2\text{O}$ | 116.7 | 46.2 | 85.5 | $\text{MgCl}_2 \cdot 6\text{H}_2\text{O} +$ $\text{MgCl}_2 \cdot 4\text{H}_2\text{O}$ |
| -3.4 | 34.4 | 52.3 | $\text{MgCl}_2 \cdot 8\text{H}_2\text{O} \alpha +$ $\text{MgCl}_2 \cdot 6\text{H}_2\text{O}$ | 152.6 | 49.1 | 96.4 | $\text{MgCl}_2 \cdot 4\text{H}_2\text{O}$ + $\text{MgCl}_2 \cdot 2\text{H}_2\text{O}$ |
| | | | about | 181.5 | 55.8 | 126.0 | $\text{MgCl}_2 \cdot 2\text{H}_2\text{O}$ |
| | | | | 186 | 56.1 | 128.0 | $\text{MgCl}_2 \cdot \text{H}_2\text{O}$ |

SOLUBILITY OF MAGNESIUM CHLORIDE IN AQUEOUS SOLUTIONS OF HYDROCHLORIC ACID AT 0°.

(Engel — Compt. rend. 104, 433, '87.)

| Milligram | Mols. per 10 cc. Solution. | Sp. Gr. of Solutions. | Grams per Liter of Solution. |
|-----------|------------------------------|-----------------------|------------------------------|
| HCl. | $\frac{1}{2}\text{MgCl}_2$. | | HCl. MgCl_2 . |
| 0.0 | 99.55 | 1.362 | 0.0 474.2 |
| 4.095 | 95.5 | 1.354 | 14.93 454.8 |
| 9.5 | 90.0 | 1.344 | 34.63 428.6 |
| 17.0 | 82.5 | 1.300 | 61.97 393.0 |
| 20.5 | 79.0 | 1.297 | 74.74 376.2 |
| 28.5 | 71.0 | 1.281 | 103.9 338.3 |
| 42.0 | 60.125 | ... | 153.1 286.4 |
| 58.75 | 46.25 | ... | 214.2 220.3 |
| 76.0 | 32.0 | ... | 277.1 152.0 |
| | | | sat. HCl (Ditte) 6.5 |

SOLUBILITY OF MIXTURES OF MAGNESIUM CHLORIDE AND OTHER SALTS IN WATER AT 25°.

(Löwenherz — Z. physik. Chem. 13, 479, '94.)

| Mixture. | Gram Mols. per 1000 Mols. H ₂ O. | Gms. per Liter of Solution. |
|---|--|--|
| MgCl ₂ ·6H ₂ O + MgSO ₄ ·6H ₂ O | 104 MgCl ₂ + 14 MgSO ₄ | 25.0 Cl + 4.4 SO ₄ |
| MgCl ₂ ·7H ₂ O + MgSO ₄ ·6H ₂ O | 73 " + 15 " | 19.5 " + 5.3 " |
| MgCl ₂ ·6H ₂ O + MgCl ₂ ·KCl·6H ₂ O | 106 Cl + 1 K ₂ + 105 Mg | 26.9 Cl + 0.3 K + 45.7 SO ₄ |

Results for the remaining possible combinations of magnesium sulphate and potassium chloride are also given.

MAGNESIUM CHROMATE MgCrO₄·7H₂O.

100 grams H₂O dissolve 72.3 grams MgCrO₄ at 18°, or 100 grams solution contain 42.0 grams. Sp. Gr. = 1.422.

(Mylus and Funk — Ber. 30, 1718, '97.)

MAGNESIUM POTASSIUM CHROMATE MgCrO₄·K₂CrO₄·2H₂O.

100 grams H₂O dissolve 28.2 grams at 20°, and 34.3 grams at 60°.

(Schweitzer.)

MAGNESIUM PLATINIC CYANIDE MgPt(CN)₄.**SOLUBILITY IN WATER.**

(Buxhoeveden and Tamman — Z. anorg. Ch. 15, 319, '97.)

| t°. | Gms. MgPt(CN) ₄ per 100 Gms. Solution. | Solid Phase. | t°. | Gms. MgPt(CN) ₄ per 100 Gms. Solution. | Solid Phase. |
|-------|---|---|-------|---|--|
| -4.12 | 24.90 | MgPt(CN) ₄ ·6.8-8.1 H ₂ O | 48.7 | 40.89 | MgPt(CN) ₄ ·4H ₂ O |
| 0.5 | 26.9 | " (Red) | 55 | 41.33 | " |
| 5.5 | 28.65 | " | 58.1 | 42.15 | " |
| 18.0 | 32.46 | " | 69.0 | 43.49 | " |
| 36.6 | 39.53 | " | 77.8 | 44.90 | " |
| 45.0 | 41.33 | " | 87.4 | 45.52 | " |
| 46.2 | 42.0 | " | 90.0 | 45.65 | " |
| 42.2 | 40.21 | MgPt(CN) ₄ ·4H ₂ O | 93.0 | 45.04 | " |
| 46.3 | 39.85 | " (Bright Green) | 96.4 | 44.33 | MgPt(CN) ₄ ·2H ₂ O |
| | | | 100.0 | 44.0 | " (White) |

MAGNESIUM FLUORIDE MgF₂.

One liter of water dissolves 0.076 gram MgF₂ at 18° by conductivity method.

(Kohlrausch — Z. physik. Ch. 50, 356, '04-'05.)

MAGNESIUM HYDROXIDE Mg(OH)₂.

One liter of water dissolves 0.008 - 0.009 gm. Mg(OH)₂ at 18° by conductivity method.

(Dupre and Brutus — Z. angew. Ch. 16, 55, '03.)

SOLUBILITY OF MAGNESIUM OXIDE IN AQUEOUS SOLUTIONS CONTAINING SODIUM CHLORIDE AND SODIUM HYDROXIDE.

(Maigret — Bull. soc. chim. 33, 631, '05.)

| Gms. NaCl per Liter. | Grams MgO per Liter Solution with Added: | |
|-------------------------|--|---------------------------|
| | 0.8 g. NaOH per Liter. | 4.0 g. NaOH per Liter. |
| 125 | 0.07 | 0.03 |
| 140 | 0.045 | ... |
| 160 | none | none |

MAGNESIUM HYDROXIDE 182

SOLUBILITY OF MAGNESIUM HYDROXIDE IN AQUEOUS SOLUTIONS OF AMMONIUM CHLORIDE AND OF AMMONIUM NITRATE AT 29°.

(Herz and Muhs — Z. anorg. Ch. 38, 140, '04.)

NOTE. — Pure $\text{Mg}(\text{OH})_2$ was prepared and an excess shaken with solutions of ammonium chloride and of ammonium nitrate of different concentrations.

| Concentration of NH_4Cl or of NH_4NO_3 . (Normal.) | Acid Required for Liberated NH_4OH in 25 cc. (Normal.) | Normality of: | | Grams per Liter. | |
|--|---|----------------------------|-------------------------------------|----------------------------|------------------------------------|
| | | $\text{Mg}(\text{OH})_2$. | NH_4Cl . | $\text{Mg}(\text{OH})_2$. | NH_4Cl . |
| .7 (NH_4Cl) | 0.09835 | 0.156 | 0.388 | 4.55 | 20.86 |
| 0.466 " | 0.1108 | 0.108 | 0.250 | 3.15 | 13.39 |
| 0.35 " | 0.09835 | 0.089 | 0.172 | 2.60 | 9.21 |
| 0.233 " | 0.1108 | 0.0638 | 0.106 | 1.86 | 5.67 |
| 0.175 " | 0.1108 | 0.049 | 0.0771 | 1.43 | 4.13 |
| 0.35 (NH_4NO_3) | 0.1108 | 0.0833 | 0.1834 (NH_4NO_3) | 2.43 | 14.69 (NH_4NO_3) |
| 0.175 " | 0.1108 | 0.0495 | 0.076 | 1.45 | 6.09 " |

MAGNESIUM IODATE $\text{Mg}(\text{IO}_3)_2$.

SOLUBILITY IN WATER.

(Mylus and Funk — Ber. 30, 1722, '97; Wiss. Abh. p. t. Reichenstalt 3, 446, '00.)

| t°. | Gms. Mg(IO ₃) ₂ per 100 Gms. Solution. | Mols. Mg(IO ₃) ₂ per 100 Mols. H ₂ O. | Solid Phase. | t°. | Gms. Mg(IO ₃) ₂ per 100 Gms. Solution. | Mols. Mg(IO ₃) ₂ per 100 Mols. H ₂ O. | Solid Phase. |
|-----|--|--|---|-----|--|--|--|
| 0 | 3.1 | 0.15 | Mg(IO ₃) ₂ ·10H ₂ O | 0 | 6.8 | 0.34 | Mg(IO ₃) ₂ ·4H ₂ O |
| 20 | 10.2 | 0.55 | " | 10 | 6.4 | 0.30 | " |
| 30 | 17.4 | 1.01 | " | 18 | 7.6 | 0.40 | " |
| 35 | 21.9 | 1.35 | " | 20 | 7.7 | 0.40 | " |
| 50 | 67.5 | 10.0 | " | 35 | 8.9 | 0.47 | " |
| | | | | 63 | 12.6 | 0.69 | " |
| | | | | 100 | 19.3 | 1.13 | " |

Sp. Gr. of solution sat. at 18° = 1.078.

MAGNESIUM IODIDE MgI_2 .

SOLUBILITY IN WATER.

(Menschutkin — Chem. Centr. 77, I, 646, '06; at 18°, Mylius and Funk — Ber. 30, 1718, '97.)

| t°. | Gms. MgI_2 per 100 Grams Solution. | Solid Phase. | t°. | Grams MgI_2 per 100 Grams Solution. | Solid Phase. |
|-----|--|--|-----|---|--|
| 0 | 50.0 | $\text{MgI}_2 \cdot 8\text{H}_2\text{O}$ | 50 | 61.6 | $\text{MgI}_2 \cdot 6\text{H}_2\text{O}$ |
| 10 | 51.65 | " | 70 | 61.85 | " |
| 18 | 53.0 (59.7 M. and F.) | " | 90 | 62.1 | " |
| 20 | 53.4 | " | 110 | 62.25 | " |
| 25 | 54.4 | " | 140 | 62.5 | " |
| 30 | 55.4 | " | 160 | 63.0 | " |
| 40 | 57.8 | " | 200 | 64.1 | " |
| 45 | 59.9 | " | | | |

Density of saturated solution at 18° = 1.909. (M. and F.)

SOLUBILITY OF MAGNESIUM IODIDE ALCOHOL COMPOUNDS IN THE CORRESPONDING ALCOHOLS.

(Menschutkin — Chem. Centr. 77, I, 335, '06.)

Results expressed in molecular per cent.

| t°. | MgI ₂ ·6CH ₃ OH in CH ₃ OH. | MgI ₂ ·6C ₂ H ₅ OH in C ₂ H ₅ OH. | t°. | MgI ₂ ·6CH ₃ OH in CH ₃ OH. | MgI ₂ ·6C ₂ H ₅ OH in C ₂ H ₅ OH. |
|-----|---|---|-----|---|---|
| 0 | 6.3 | 2.3 | 100 | 10.5 | 19.7 |
| 10 | 6.6 | 3.1 | 120 | 11.8 | 28.2 |
| 20 | 7.0 | 4.0 | 140 | 13.4 | 53.6 |
| 40 | 7.8 | 6.2 | 160 | 15.7 | 80.3 (145°) |
| 60 | 8.6 | 9.3 | 180 | 18.7 | 100.0 (146.5°) |
| 80 | 9.5 | 13.5 | 200 | 23.1 | ... |

SOLUBILITY OF MAGNESIUM IODIDE DI ETHERATE (MgI₂·2C₄H₁₀O) IN ETHYL ETHER.

(Menschutkin — Z. anorg. Ch. 49, 46, '06.)

Synthetic Method used, see page 9.

Results in the Critical Vicinity.

| t°. | Grams per 100 Gms. Solution. | | t°. | Gms. per 100 Gms. Solution. | |
|------|------------------------------|--|------|-----------------------------|--|
| | MgI ₂ . | MgI ₂ ·2C ₄ H ₁₀ O. | | MgI ₂ . | MgI ₂ ·2C ₄ H ₁₀ O. |
| 5.4 | 1.45 | 2.2 | 37.3 | 19.4 | 29.3 |
| 11.8 | 2.43 | 3.7 | 38.5 | 22.45 | 34.4 |
| 15.6 | 3.46 | 5.3 | 38.5 | 26.07 | 39.9 |
| 18.1 | 5.4 | 8.3 | 38.5 | 29.8 | 45.7 |
| 20.4 | 7.55 | 11.6 | 38 | 32.8 | 50.3 |
| 22.2 | 11.28 | 17.3 | | | |

Two liquid phases appear near the melting point of the magnesium iodide di etherate. The lower may be considered as a solution of ether in di etherate, and the upper as a solution of the lower layer in ether. The critical temperature is 38.5°.

Lower Layer.

| t°. | Gms. per 100 Gms. Solution. | |
|------|-----------------------------|--|
| | MgI ₂ . | MgI ₂ ·2C ₄ H ₁₀ O. |
| 14.8 | 35.5 | 54.4 |
| 20.0 | 35.8 | 54.8 |
| 28.4 | 35.5 | 54.4 |
| 33 | 35.7 | 54.7 |
| 35 | 35.3 | 54.1 |

Upper Layer.

| t°. | Gms. per 100 Gms. Solution. | |
|------|-----------------------------|--|
| | MgI ₂ . | MgI ₂ ·2C ₄ H ₁₀ O. |
| 18.6 | 13.57 | 20.8 |
| 23.2 | 14.4 | 22.1 |
| 24.4 | 14.6 | 22.4 |
| 32.4 | 15.82 | 24.2 |

The solubility of double compounds of magnesium iodide and alkyl esters in the corresponding acetates is given by Menschutkin — Chem. Centr. 77, I, 647, '06. For the solubility of magnesium iodide hexa acetic acid compound in aqueous acetic acid solutions see Chem. Centr. 77, II, 1482, '06.

MAGNESIUM NITRATE

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MAGNESIUM NITRATE $\text{Mg}(\text{NO}_3)_2$.

SOLUBILITY IN WATER.

(Funk — Wiss. Abb. p. t. Reichanstalt 3, 437, '00.)

| t°. | Gms. $\text{Mg}(\text{NO}_3)_2$ per 100 Gms. Solution. | Mols. $\text{Mg}(\text{NO}_3)_2$ per 100 Mols. H_2O . | Solid Phase. | t°. | Gms. $\text{Mg}(\text{NO}_3)_2$ per 100 Gms. Solution. | Mols. $\text{Mg}(\text{NO}_3)_2$ per 100 Mols. H_2O . | Solid Phase. |
|------|---|--|--|------|---|--|--|
| -23 | 35.44 | 6.6 | $\text{Mg}(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}$ | 40 | 45.87 | 10.3 | $\text{Mg}(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}$ |
| -20 | 36.19 | 7.0 | " | 80 | 53.69 | 14.6 | " |
| -18 | 38.03 | 7.4 | " | 90 | 57.81 | 16.7 | " |
| -18 | 38.03 | 7.37 | $\text{Mg}(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}$ | 89 | 63.14 | 20.9 | } |
| -4.5 | 39.50 | 7.92 | " | 77.5 | 65.67 | 23.2 | |
| 0 | 39.96 | 8.08 | " | 67 | 67.55 | 25.1 | |
| +18 | 42.33 | 8.9 | " | | | | |

* Reverse curve.

Sp. Gr. of solution saturated at 18° = 1.384.

MAGNESIUM OXALATE $\text{Mg}_2\text{C}_2\text{O}_4 \cdot 2\text{H}_2\text{O}$.

One liter of water dissolves 0.3 gram MgC_2O_4 at 18° (conductivity method).

(Kohlrausch — Z. physik. Ch. 50, 356, '05.)

MAGNESIUM (Hypo) PHOSPHATE $\text{Mg}_2\text{P}_2\text{O}_6 \cdot 12\text{H}_2\text{O}$.

One liter of water dissolves 0.066 gram hypophosphate.

(Salzer — Liebig's Ann. 232, 114, '86.)

One liter of water dissolves 5.0 grams magnesium hydrogen hypophosphate $\text{MgH}_2\text{P}_2\text{O}_6 \cdot 4\text{H}_2\text{O}$.

(Salzer.)

MAGNESIUM SALICYLATE $\text{Mg}(\text{C}_7\text{H}_5\text{O}_3)_2 \cdot 4\text{H}_2\text{O}$.

One liter of saturated solution contains 8.015 grams of the salt.

(Barthe — Bull. soc. chim. [3] 11, 519, '94.)

MAGNESIUM FLUOSILICATE $\text{MgSiF}_6 \cdot 6\text{H}_2\text{O}$.

One liter of water dissolves 652 grams of the salt at 17.5° Sp. Gr. of solution = 1.235.

(Stolba — Chem. Centrbl. 578, '77.)

MAGNESIUM SULPHATE MgSO_4 .

SOLUBILITY IN WATER.

(Mulder; Tilden — J. Ch. Soc. 45, 409, '84; Etard — Compt. rend. 106, 741, '88.)

Etard's results for the lower temperatures are somewhat low. Mulder's and Tilden's results agree very well.

| t°. | Gms. MgSO_4 Solution. | per 100 Gms. Water. | Solid Phase. | t°. | Gms. MgSO_4 Solution. | per 100 Gms. Water. | Solid Phase. |
|-----|-----------------------------------|------------------------|---|-----|-----------------------------------|------------------------|---|
| 0 | 21.2 | 26.9 | $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$ | 50 | 33.5 | 50.3 | $\text{MgSO}_4 \cdot 6\text{H}_2\text{O}$ |
| 10 | 24.0 | 31.5 | " | 60 | 35.5 | 55.0 | " |
| 20 | 26.5 | 36.2 | " | 70 | 37.5 | 59.6 | " |
| 25 | 28.2 | 38.5 | " | 80 | 39.1 | 64.2 | " |
| 30 | 29.0 | 40.9 | " | 90 | 40.7 | 68.9 | " |
| 40 | 31.2 | 45.6 | " | 100 | 42.5 | 73.8 | " |
| | | | | 110 | 45.5 | 83.6 | " |

For temperatures between 123° and 190°, grams MgSO_4 per 100 grams solution = 48.5 - 0.4403 t. (Etard).

For densities of aqueous solutions of MgSO_4 , see Barnes and Scott—J. Physic. Ch. 2, 542, '08.

SOLUBILITY OF MAGNESIUM SULPHATE IN METHYL AND ETHYL ALCOHOLS.

(de Bruyn — Rec. trav. chim. 11, 112, '92.)

| Solvent. | t°. | Per 100 Gms. Solvent. | Solvent. | t°. | Per 100 Gms. Solvent. |
|-------------------------|-----|---|---------------------------------------|-----|---|
| Abs. CH ₃ OH | 18 | 1.18 gms. MgSO ₄ | 93% Methyl Alc. | 17 | 9.7 gms. MgSO ₄ ·7H ₂ O |
| " | 17 | 41.0 " MgSO ₄ ·7H ₂ O | 50% " " | 3-4 | 4.1 " " |
| " | 3-4 | 29.0 " " | Abs. C ₂ H ₅ OH | 3 | 1.3 " " |

SOLUBILITY IN AQUEOUS ETHYL ALCOHOL.

(Schiff — Liebig's Ann. 118, 365, '61.)

| Wt. per cent Alcohol | 10 | 20 | 40 |
|--|------|------|------|
| G. MgSO ₄ ·7H ₂ O per 100 gms. solvent | 64.7 | 27.1 | 1.65 |

SOLUBILITY OF MAGNESIUM SULPHATE IN SATURATED SUGAR SOLUTION AT 31.25°.

(Köhler — Z. Ver. Zuckerind. 47, 447, '97.)

100 grams saturated aqueous solution contain 46.52 grams sugar + 14.0 grams MgSO₄.

100 grams water dissolve 119.6 grams sugar + 36.0 grams MgSO₄.

MAGNESIUM POTASSIUM SULPHATE MgK₂(SO₄)₂·6H₂O.**SOLUBILITY IN WATER.**

(Tobler — Liebig's Ann. 95, 193, '55.)

| | t° = 0° | 20° | 30° | 45° | 60° | 75° |
|---|---------|------|------|------|------|------|
| Gms. MgK ₂ (SO ₄) ₂ per 100 gms. H ₂ O | 14.1 | 25.0 | 30.4 | 40.5 | 50.2 | 59.8 |

MAGNESIUM SULPHITE MgSO₃·6H₂O.

100 grams cold water dissolve 1.25 grams sulphite; 100 grams boiling water dissolve 0.83 gram.

(Hager — Chem. Centr. 135, '75.)

MALONIC ACID CH₂(COOH)₂.**SOLUBILITY IN WATER.**

(Klobbie — Z. physik. Chem. 24, 622, '97; Miczynski — Monatsh. Ch. 7, 259, '86; Henry — Compt. rend. 99, 1157, '84; Lamouroux — *Ibid.* 128, '998, '99.)

| t°. | Grams CH ₂ (COOH) ₂ per 100 Gms. Solution.* | | cc. Solution (L.). | t°. | Grams CH ₂ (COOH) ₂ per 100 Gms. Solution.* | | cc. Solution (L.). |
|-----|---|------|--------------------|--------------|---|-------|--------------------|
| 0 | 52.0 | 61.0 | | 50 | 71.0 | 93.0 | |
| 10 | 56.5 | 67.0 | | 60 | 74.5 | 100.0 | |
| 20 | 60.5 | 73.0 | | 70 | ... | 106.0 | |
| 25 | 62.2 | 76.3 | | 80 | 82.0 | ... | |
| 30 | 64.0 | 80.0 | | 100 | 89.0 | ... | |
| 40 | 68.0 | 86.5 | | 132 (m. pt.) | 100.0 | ... | |

* Average curve from results of K., M., and H.

SOLUBILITY OF MALONIC ACID IN ETHER.
(Klobbie.)

| t°. | Gms. $\text{CH}_2(\text{COOH})_2$ per 100 Gms. Solution. | t°. | Gms. $\text{CH}_2(\text{COOH})_2$ per 100 Gms. Solution. | t°. | Gms. $\text{CH}_2(\text{COOH})_2$ per 100 Gms. Solution. |
|-----|--|-----|--|--------------|--|
| 0 | 6.25 | 30 | 10.5 | 100 | 46.0 |
| 10 | 7.74 | 80 | 33.0 | 110 | 56.0 |
| 20 | 9.00 | 90 | 39.0 | 120 | 70.0 |
| 25 | 9.7 | | | 132 (m. pt.) | 100.0 |

100 grams saturated solution of malonic acid in pyridine contain 14.6 grams at 26°.

(Holty — J. Physic. Ch. 9, 764, '05.)

 SOLUBILITY OF SUBSTITUTED MALONIC ACIDS IN WATER.
(Lamoureux.)

| t°. | Grams per 100 cc. Saturated Aqueous Solution. | | | | | |
|-----|---|----------------------------|---------------------------|------------------------------|-----------------------------|------------------------------|
| | Malonic Acid. | Methyl Malonic Acid. | Ethyl Malonic Acid. | n Propyl Malonic Acid. | n Butyl Malonic Acid. | Iso Amyl Malonic Acid. |
| 0 | 61.1 | 44.3 | 52.8 | 45.6 | 11.6 | 38.5 |
| 15 | 70.2 | 58.5 | 63.6 | 60.1 | 30.4 | 51.8 |
| 25 | 76.3 | 67.9 | 71.2 | 70.0 | 43.8 | 79.3 |
| 30 | 92.6 | 91.5 | 90.8 | 94.4 | 79.3 | 83.4 |

 MANGANESE BORATE $\text{MnH}_4(\text{BO}_3)_2$.

 SOLUBILITY IN WATER AND IN AQUEOUS SALT SOLUTIONS.
(Hartley and Ramage — J. Ch. Soc. 63, 137, '93.)

| t°. | Grams $\text{MnH}_4(\text{BO}_3)_2$ per Liter in Solutions of: | | | | |
|-----|--|--|---|--|--|
| | $\text{H}_2\text{O} +$ trace Na_2SO_4 . | Na_2SO_4 (0.2 Gms. per Liter). | Na_2SO_4 (20 Gms. per Liter). | NaCl (20 Gms. per Liter). | CaCl_2 (20 Gms. per Liter). |
| 14 | 0.94 | 1.7 | ... | ... | ... |
| 18 | ... | ... | 0.77 | 1.31 | 2.91 |
| 40 | 0.50 | 0.69 (52°) | 0.65 | ... | 2.44 |
| 60 | ... | ... | 0.36 | 0.60 | 2.25 |
| 80 | 0.08 | ... | 0.12 | 0.29 | 1.35 |

 MANGANESE BROMIDE MnBr_2 .

 SOLUBILITY IN WATER.
(Etard — Ann. chim. phys. [7] 2, 537, '94.)

| t°. | Gms. MnBr_2 per 100 Gms. Solution. | Solid Phase. | t°. | Gms. MnBr_2 per 100 Gms. Solution. | Solid Phase. |
|-----|---|---|-----|---|---|
| -20 | 52.3 | $\text{MnBr}_2 \cdot 4\text{H}_2\text{O}$ | 40 | 62.8 | $\text{MnBr}_2 \cdot 4\text{H}_2\text{O}$ |
| -10 | 54.2 | " | 50 | 64.5 | " |
| 0 | 56.0 | " | 60 | 66.3 | " |
| 10 | 57.6 | " | 70 | 68.0 | " |
| 20 | 59.5 | " | 80 | 69.2 | $\text{MnBr}_2 \cdot \text{H}_2\text{O}$ |
| 25 | 60.2 | " | 90 | 69.3 | " |
| 30 | 61.1 | " | 100 | 69.5 | " |

MANGANESE CHLORIDE MnCl_2 .**SOLUBILITY IN WATER.**

(Etard; Dawson and Williams — Z. physik. Chem. 31, 63, '99.)

| t°. | Sp. Gr. of Solutions. | Grams MnCl_2 per 100 Grams | | Mols. MnCl_2 per 100 Mols. H_2O . | Solid Phase. |
|-------|-----------------------|-------------------------------------|-----------|--|---|
| | | Water. | Solution. | | |
| -20 | ... | 53.8 | 35.0 | ... | $\text{MnCl}_2 \cdot 4\text{H}_2\text{O}$ |
| -10 | ... | 58.7 | 37.0 | ... | " |
| 0 | ... | 63.4 | 38.8 | ... | " |
| +10 | ... | 68.1 | 40.5 | ... | " |
| 20 | ... | 73.9 | 42.5 | ... | " |
| 25 | 1.4991 | 77.18 | 43.55 | 11.08 | " |
| 30 | 1.5049 | 80.71 | 44.68 | 11.55 | " |
| 40 | 1.5348 | 88.59 | 46.96 | 12.69 | " |
| 50 | 1.5744 | 98.15 | 49.53 | 14.05 | " |
| 57.65 | 1.6097 | 105.4 | 51.33 | 15.10 | " |
| 60 | 1.6108 | 108.6 | 52.06 | 15.55 | $\text{MnCl}_2 \cdot 2\text{H}_2\text{O}$ |
| 70 | 1.6134 | 110.6 | 52.52 | 15.85 | " |
| 80 | ... | 112.7 | 52.98 | 16.14 | " |
| 90 | ... | 114.1 | 53.2 | ... | " |
| 100 | ... | 115.3 | 53.5 | ... | " |
| 120 | ... | 118.8 | 54.3 | ... | " |
| 140 | ... | 119.5 | 55.0 | ... | " |

One liter of water dissolves 87.0 grams MnCl_2 . One liter of sat. HCl dissolves 19.0 grams MnCl_2 at 12°.

(Ditte — Compt. rend. 92, 242, '81.)

MANGANESE FLUO SILICATE $\text{MnSiF}_6 \cdot 6\text{H}_2\text{O}$.

100 grams H_2O dissolve 140 grams salt at 17.5°. Sp. Gr. of solution = 1.448.

(Stolba — Chem. Centr. 292, '83.)

MANGANESE NITRATE $\text{Mn}(\text{NO}_3)_2$.**SOLUBILITY IN WATER.**

(Funk — Wiss. Abh. p. t. Reichenstalt 3, 438, '00.)

| t°. | Gms. | | Mols. per 100 Gms. Sol. | Mols. per 100 Mols. H ₂ O. | Solid Phase. | t°. | Gms. | | Mols. per 100 Gms. Sol. | Mols. per 100 Mols. H ₂ O. | Solid Phase. |
|-----|-----------------------------------|-----------------------------------|-------------------------------|---|---|------|-----------------------------------|-----------------------------------|-------------------------------|---|---|
| | Mn(NO ₃) ₂ | Mn(NO ₃) ₂ | | | | | Mn(NO ₃) ₂ | Mn(NO ₃) ₂ | | | |
| -29 | 42.29 | 7.37 | | | Mn(NO ₃) ₂ ·6H ₂ O. | 18 | 57.33 | 13.5 | | | Mn(NO ₃) ₂ ·6H ₂ O. |
| -26 | 43.15 | 7.63 | | | " | 25 | 62.37 | 16.7 | | | " |
| -21 | 44.30 | 8.0 | | | " | 27 | 65.66 | 19.2 | | | Mn(NO ₃) ₂ ·3H ₂ O. |
| -16 | 45.52 | 8.4 | | | " | 29 | 66.99 | 20.4 | | | " |
| -5 | 48.88 | 9.61 | | | " | 30 | 67.38 | 20.7 | | | " |
| 0 | 50.49 | 10.2 | | | " | 34 | 71.31 | 24.9 | | | " |
| +11 | 54.50 | 12.0 | | | " | 35.5 | 76.82 | 33.3 | | | " |

Sp. Gr. of solution saturated at 18° = 1.624.

MANGANESE (Hypo) PHOSPHITE $\text{Mn}(\text{PH}_2\text{O}_2)_2 \cdot \text{H}_2\text{O}$.

100 grams H_2O dissolve 15.15 grams salt at 25°, and 16.6 grams at b. pt.

MANGANESE SULPHATE MnSO_4 .

SOLUBILITY IN WATER.

(Cottrell — J. Physic. Ch. 4, 651, '01; Richards and Fraprie — Am. Ch. J. 26, 77, '01. The results of Linebarger — Am. Ch. J. 15, 225, '93, were shown to be incorrect by Cottrell, and this conclusion was confirmed by R. and F.)

| t°. | Grams MnSO_4 per 100 Gms. | | Solid Phase. | t°. | Grams MnSO_4 per 100 Gms. | | Solid Phase. |
|------|------------------------------------|-----------|---|------|------------------------------------|-----------|---|
| | Water. | Solution. | | | Water. | Solution. | |
| — 10 | 47.96 | 32.40 | $\text{MnSO}_4 \cdot 7\text{H}_2\text{O}$ | 16 | 63.94 | 38.99 | $\text{MnSO}_4 \cdot 4\text{H}_2\text{O}$ |
| 0 | 53.23 | 34.73 | " | 18.5 | 64.19 | 39.10 | " |
| 5 | 56.24 | 35.99 | " | 25 | 65.32 | 39.53 | " |
| 9 | 59.33 | 37.24 | " | 30 | 66.44 | 39.93 | " |
| 12 | 61.77 | 38.19 | " | 39.9 | 68.81 | 40.77 | " |
| 14.3 | 63.93 | 39.00 | " | 49.9 | 72.63 | 42.08 | " |
| 5 | 58.06 | 36.69 | $\text{MnSO}_4 \cdot 5\text{H}_2\text{O}$ | 41.4 | 60.87 | 37.84 | $\text{MnSO}_4 \cdot \text{H}_2\text{O}$ |
| 9 | 59.19 | 37.18 | " | 50 | 58.17 | 36.76 | " |
| 15 | 61.08 | 37.91 | " | 60 | 55.0 | 35.49 | " |
| 25 | 64.78 | 39.31 | " | 70 | 52.0 | 34.22 | " |
| 30 | 67.76 | 40.38 | " | 80 | 48.0 | 32.43 | " |
| 35.5 | 71.61 | 41.74 | " | 90 | 42.5 | 29.83 | " |
| | | | | 100 | 32.0 | 24.24 | " |

SOLUBILITY OF MANGANESE SULPHATE, COPPER SULPHATE MIXED CRYSTALS IN WATER AT 18°.

(Stortenbecker — Z. physik. Chem. 34, 112, '00.)

| Mols. per 100 H_2O . | | Mols. per cent Cu in : | | Mols. per 100 H_2O . | | Mols. per cent Cu in : | |
|---|------|------------------------|-----------|--|-------|------------------------|-----------|
| Cu. | Mn. | Solution. | Crystals. | Cu. | Mn. | Solution. | Crystals. |
| Solid Phase, $\text{CuMnSO}_4 \cdot 5\text{H}_2\text{O}$, Triclinic. | | | | | | | |
| 2.282 | 0 | 100 | 100 | [0.73 | 6.37 | 10.27 | 10.5] |
| ... | ... | 90.5 | ... | ... | ... | 5.0 | 4.9 |
| 2.23 | 0.44 | 83.5 | ... | 0.34 | 7.03 | 4.60 | ... |
| ... | ... | 74.1 | 97.3 | ... | ... | 2.31 | 2.15 |
| ... | ... | 57.7 | 95.1 | ... | 7.375 | 0.0 | 0.0 |
| ... | ... | 31.0 | 81.3 | Solid Phase, CuMnSO_4 , Monoclinic. $7\text{H}_2\text{O}$. | | | |
| 1.54 | 3.76 | 29.0 | ... | ... | ... | 20.4 | 28.2* |
| ... | ... | 26.1 | 70.4 | [1.06 | 5.58 | 15.9 | 23.5] |
| 1.31 | 4.70 | 21.8 | ... | ... | ... | 12.45 | 20.8 |
| ... | ... | 21.2 | 42.6 | [0.73 | 6.37 | 10.27 | 16.0] |
| ... | ... | 20.0 | 34.4 | ... | ... | 4.60 | 5.8* |
| [1.06 | 5.58 | 15.9 | 22.9] | ... | ±8 | 0.0 | 0.0 |
| ... | ... | 13.9 | 15.2* | | | | |

* Indicates meta stabil points.

$\text{CuMnSO}_4 \cdot 5\text{H}_2\text{O}$ = 100–90.8 and 2.11–0 mol. per cent Cu.

$\text{CuMnSO}_4 \cdot 7\text{H}_2\text{O}$ = 37.8–4.92 mol. per cent Cu.

SOLUBILITY OF MANGANESE SULPHATE IN GLYCOL.

100 grams saturated solution contain 0.5 gram MnSO_4 .

(de Coninck — Bul. acad. roy. Belgique, 359, '05.)

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SOLUBILITY OF MANGANESE SULPHATE IN AQUEOUS ETHYL AND PROPYL ALCOHOL SOLUTIONS AT 20°.

(Linebarger — Am. Ch. J. 14, 380, '92; Snell — J. Physic. Ch. 2, 474, '98.)

| Conc. of Alcohol in Wt. per cent. | Gms. MnSO ₄ per 100 Gms. Aq. | | Conc. of Alcohol in Wt. per cent. | Gms. MnSO ₄ per 100 Gms. Aq. | |
|--------------------------------------|---|-------------|--------------------------------------|---|-------------|
| | Ethyl Alc. | Propyl Alc. | | Ethyl Alc. | Propyl Alc. |
| 34 | 9.5 | 6.0 | 44 | 3.3 | 1.9 |
| 36 | 7.2 | 4.6 | 48 | 2.2 | 1.4 |
| 38 | 5.8 | 3.5 | 52 | 1.4 | 1.1 |
| 40 | 4.7 | 2.8 | | | |

MANGANESE POTASSIUM VANADATE MnKV₅O₁₄.8H₂O.

100 grams H₂O dissolve 1.7 grams salt at 18°.

(Radan — Liebig's Ann. 251, 129, '89.)

MANNITE C₆H₈(OH)₆.

SOLUBILITY IN WATER.

(Campetti — Abs. in Z. physik. Chem. 41, 109, '02.)

| t°. | Grams C ₆ H ₈ (OH) ₆ per 100 Grams. | |
|-----|--|-----------|
| | Water. | Solution. |
| 10 | 13.94 | 12.78 |
| 15 | 16.18 | 14.63 |
| 20 | 18.98 | 16.86 |

100 grams of saturated solution of mannite in Pyridine contain 0.47 gram C₆H₈(OH)₆ at 26°.

(Holty — J. Physic. Ch. 9, 764, '05.)

MANNITOL C₆H₈(OH)₆.

SOLUBILITY IN WATER.

(Findlay — J. Ch. Soc. 81, 1219, '02.)

| t°. | Wt. of 1 cc. in Grams. | Gms. Mannitol per 100 Gms. H ₂ O. | G. M. Mannitol per 100 G.M. H ₂ O. | t°. | Wt. of 1 cc. in Grams. | Gms. Mannitol per 100 Gms. H ₂ O. | G. M. Mannitol per 100 G.M. H ₂ O. |
|-----|---------------------------|---|--|-----|---------------------------|---|--|
| 0 | 1.044 | 7.59 | 0.75 | 50 | 1.099 (47.7°) | 47.01 | 4.65 |
| 10 | ... | 11.63 | 1.15 | 60 | ... | 60.01 | 5.94 |
| 15 | 1.05 | 14.38 | 1.42 | 70 | 1.148 (68°) | 74.50 | 7.35 |
| 20 | ... | 17.71 | 1.75 | 80 | ... | 91.5 | 9.04 |
| 25 | ... | 21.39 | 2.11 | 90 | 1.207 (85.9°) | 110.8 | 10.96 |
| 30 | 1.076 (31.1°) | 25.40 | 2.51 | 100 | ... | 133.1 | 13.17 |
| 40 | ... | 35.40 | 3.50 | | | | |

NOTE. — In the original paper the author writes, "grams of substance in 100 grams of solvent (percentage solubility)" and "moles of substance in 100 mols of solvent (percentage molar solubility)," thus implying equivalence of the terms and giving rise to uncertainty as to which is really intended.

MERCURY BROMIDE (ic) HgBr₂. SOLUBILITY IN WATER.

| t°. | Gms. HgBr ₂ per 100 Gms. H ₂ O. | Authority. |
|-----|--|---|
| 9 | 1.06 | (Lassaigne — J. chim. med. 12, 177, '76.) |
| 25 | 0.61 | (Sherrill — Z. physik. Ch. 43, 727, '03.) |
| 100 | 20-25 | (Lassaigne.) |

SOLUBILITY OF MERCURIC BROMIDE ORGANIC SOLVENTS.

In Carbon Bisulphide.

(Arctowski — Z. anorg. Ch. 6, 267, '94.)

| t°. | Gms. HgBr ₂ per 100 Gms. Solution. | t°. | Gms. HgBr ₂ per 100 Gms. Solution. |
|-----|---|-----|---|
| -10 | 0.049 | 15 | 0.140 |
| -5 | 0.068 | 20 | 0.187 |
| 0 | 0.087 | 25 | 0.232 |
| +5 | 0.105 | 30 | 0.274 |
| 10 | 0.122 | | |

In Other Solvents at 18°-20°.

(Sulc. — *Ibid.* 25, 401, '00.)

| Solvent. | Formula. | Gms. HgBr ₂ per 100 Gms. Solvent. |
|---------------------|---|--|
| Chloroform | CHCl ₃ | 0.126 |
| Bromoform | CHBr ₃ | 0.679 |
| Tetra Chlor Methane | CCl ₄ | 0.003 |
| Ethyl Bromide | C ₂ H ₅ Br | 2.31 |
| Ethylene Di Bromide | C ₂ H ₄ Br ₂ | 2.34 |

Mercurous bromide Hg₂Br₂. One liter of saturated aqueous solution contains 0.000039 gram Hg₂Br₂ at 25°.

(Sherrill)

MERCURY CHLORIDE (ic) HgCl₂.

SOLUBILITY IN WATER.

(Etard — Ann. chim. phys. [7] 2, 563, '94; at 25°, Foote and Levy — Am. Ch. J. 35, 238, '06; at room temp. Rohland — Z. anorg. Ch. 18, 328 '98; see also Poggiale — Ann. chim. phys. [3] 8, 468, '43.)

| t°. | Gms. HgCl ₂ per 100 Gms. Solution. | t°. | Gms. HgCl ₂ per 100 Gms. Solution. | t°. | Gms. HgCl ₂ per 100 Gms. Solution. |
|-----|--|-----|--|-----|--|
| 0 | 3.5 | 30 | 7.2 | 100 | 38.0 |
| 10 | 4.5 | 40 | 9.3 | 120 | 59.0 |
| 20 | 5.4 (6.88, R.) | 60 | 14.0 | 140 | 77.0 |
| 25 | 6.9 (F. and L.) | 80 | 23.1 | 150 | 78.5 |

SOLUBILITY OF MERCURIC CHLORIDE IN AQUEOUS SOLUTIONS OF SODIUM CHLORIDE.

(Homeyer and Ritsert — Pharm. Ztg. 33, 738, '88.)

| Per cent Concentration of NaCl Solutions. | Gms. HgCl ₂ per 100 Gms. NaCl Solution at: | | |
|--|---|-----|------|
| | 15° | 65° | 100° |
| 0.5 | 10 | 13 | 44 |
| 1.0 | 14 | 18 | 48 |
| 5.0 | 30 | 36 | 64 |
| 10.0 | 58 | 68 | 110 |
| 25.0 | 120 | 142 | 196 |
| 26.0 (saturated) | 128 | 152 | 208 |

SOLUBILITY OF MERCURIC CHLORIDE IN AQUEOUS SOLUTIONS OF HYDROCHLORIC ACID AT:

0°.

(Engel — Ann. chim. phys. [6] 17, 362, '89.)

| Mg. Mols. per 100 cc. Sol. | Gms. per 100 cc. Sol. | Sp. Gr. of |
|---------------------------------|-----------------------|------------|
| HCl. | HCl. | Solutions. |
| $\frac{1}{2}$ HgCl ₂ | HgCl ₂ | |
| 4.3 | 9.7 | 1.57 |
| 9.9 | 19.8 | 1.3.11 |
| 17.8 | 35.5 | 1.238 |
| 26.9 | 55.6 | 1.427 |
| 32.25 | 68.9 | 1.665 |
| 34.25 | 72.4 | 1.811 |
| 41.5 | 85.5 | 1.874 |
| 48.1 | 88.6 | 2.023 |
| 70.9 | 95.7 | 2.066 |
| | | 2.198 |

20-25° (?).

(Ditte — *Ibid.* [5] 22, 551, '81.)

| Parts HCl per 100 Parts H ₂ O. | Parts HgCl ₂ per 100 Parts Solution. |
|---|---|
| 0.0 | 6.8 |
| 5.6 | 46.8 |
| 10.1 | 73.7 |
| 13.8 | 87.8 |
| 21.1 | 127.4 |
| 31.0 | 141.9 |
| 50.0 | 148.0 |
| 68.0 | 154.0 |

SOLUBILITY OF MIXTURES OF SODIUM AND MERCURIC CHLORIDE IN WATER AT 25°.

(Foote and Levy — Am. Ch. J. 35, 239, '06.)

| Gms. per 100 Gms. Solution. | | Gms. per 100 Gms. Undissolved Residue. | | | Solid Phase. |
|--|---------------------|--|---------------------|-------------------|--|
| NaCl. | HgCl ₂ . | NaCl. | HgCl ₂ . | H ₂ O. | |
| 26.5 | none | 100 | none | none | NaCl |
| 18.66 | 51.35 | ... | 16.39 | ... | NaCl and NaCl.HgCl ₂ .2H ₂ O |
| 18.71 | 51.32 | ... | 21.98 | ... | |
| 18.64 | 51.42 | ... | 65.42 | ... | |
| 18.87 | 51.26 | ... | 71.25 | ... | |
| 14.97 | 57.74 | 16.38 | 74.18 | 9.44 | Double Salt NaCl.HgCl ₂ .2H ₂ O Calc. Comp. = 16.01% NaCl 74.14% HgCl ₂ .85% H ₂ O |
| 14.03 | 59.69 | 16.36 | 74.21 | 9.43 | |
| 13.25 | 62.16 | 16.16 | 74.70 | 9.14 | |
| 13.17 | 62.59 | 15.96 | 74.76 | 9.28 | |
| 12.97 | 62.50 | ... | 78.20 | ... | NaCl.HgCl ₂ .2H ₂ O and HgCl ₂ |
| 13.14 | 62.48 | ... | 88.64 | ... | |
| 13.15 | 62.55 | ... | 90.83 | ... | |
| Two determinations made at 10.3° gave: | | | | | |
| 19.46 | 46.49 | 67.46 | 29.19 | 3.35 | |
| 19.48 | 46.50 | 22.83 | 68.85 | 8.32 | |

SOLUBILITY OF MIXTURES OF POTASSIUM AND MERCURIC CHLORIDES IN WATER AT 25°.

(Foote and Levy.)

| Composition of Solution. Grams per 100 Grams Solution. | | Percentage Composition of Undissolved Residue | | | Solid Phase. |
|---|---------------------|---|---------------------|-------------------|---|
| KCl. | HgCl ₂ . | KCl. | HgCl ₂ . | H ₂ O. | |
| 26.46 | none | 100 | none | ... | KCl |
| 26.24 | 15.04 | ... | 3.63 | ... | KCl and 2KCl.HgCl ₂ .H ₂ O |
| 26.43 | 15.02 | ... | 26.15 | ... | |
| 26.33 | 15.02 | ... | 52.01 | ... | |
| 26.33 | 14.92 | ... | 61.04 | ... | |
| 23.74 | 18.91 | 34.61 | 61.66 | 3.73 | 2KCl.HgCl ₂ .H ₂ O Calc. Composition 34.05% KCl, 61.84% HgCl ₂ , 4.11% H ₂ O |
| 22.36 | 21.39 | 34.77 | 62.02 | 3.21 | |
| 21.39 | 23.88 | 34.05 | 61.84 | 3.35 | |
| 20.32 | 27.62 | ... | 65.24 | ... | |
| 20.26 | 27.38 | ... | 73.98 | ... | 2KCl.HgCl ₂ .H ₂ O and KCl.HgCl ₂ .H ₂ O |
| 17.85 | 25.34 | 21.89 | 75.10 | 3.01 | |
| 9.26 | 18.95 | 21.02 | 73.36 | 5.62 | |
| 7.80 | 19.56 | 20.76 | 73.06 | 6.18 | |
| 6.84 | 22.81 | 20.75 | 74.54 | 4.71 | KCl.HgCl ₂ .H ₂ O Calc. Composition 20.52% KCl, 74.53% HgCl ₂ , 5.47% H ₂ O |
| 6.66 | 24.32 | 20.54 | 73.99 | 5.47 | |
| 6.52 | 25.13 | ... | 76.46 | ... | |
| 6.64 | 25.16 | ... | 80.60 | ... | |
| 6.27 | 25.11 | 12.09 | 83.20 | 4.71 | KCl.2HgCl ₂ .2H ₂ O Calc. Composition 11.43% KCl, 83.05% HgCl ₂ .5.52% H ₂ O |
| 5.77 | 24.73 | 11.87 | 83.18 | 4.95 | |
| 4.68 | 24.75 | ... | 84.46 | ... | |
| 4.66 | 25.17 | ... | 93.68 | ... | |
| 4.69 | 24.82 | ... | 98.50 | ... | KCl.2HgCl ₂ .2H ₂ O and HgCl ₂ |
| none | 6.90 | none | 100.00 | none | |
| | | | | | HgCl ₂ |

SOLUBILITY OF MIXTURES OF RUBIDIUM AND MERCURIC CHLORIDES
IN WATER AT 25°.

(Foote and Levy.)

| Composition of Solution. Grams per 100 Grams. Solution. | | Percentage Composition of Undissolved Residue. | | | Solid Phase. |
|---|---------------------|---|---------------------|-------------------|---|
| RbCl. | HgCl ₂ . | RbCl. | HgCl ₂ . | H ₂ O. | |
| 48.57 | none | 100.0 | none | none | RbCl |
| 46.76 | 9.18 | 88.04 | 11.24 | 0.72 | RbCl and 2RbCl.HgCl ₂ .H ₂ O |
| 47.54 | 9.49 | 60.33 | 37.51 | 2.16 | |
| 47.55 | 9.39 | 56.59 | 40.75 | 2.66 | |
| 47.3 | 9.47 | 46.73 | 49.38 | 3.88 | 2RbCl.HgCl ₂ .H ₂ O Calc. Com- position 45.55% RbCl, 51.05% HgCl ₂ , 3.4% H ₂ O |
| 47.65 | 10.35 | 46.50 | 50.92 | 2.58 | |
| 35.16 | 19.58 | 45.98 | 50.80 | 3.22 | 2RbCl.HgCl ₂ .H ₂ O and 3RbCl. 2HgCl ₂ .2H ₂ O |
| 34.77 | 19.94 | 43.07 | 52.44 | 4.49 | |
| 34.76 | 20.10 | 41.10 | 55.36 | 3.54 | 3RbCl.2HgCl ₂ .2H ₂ O Calc. Composition 38.55% RbCl, 57.62% HgCl ₂ , 3.82% H ₂ O |
| 30.27 | 20.17 | 39.07 | 57.34 | 3.59 | |
| 29.20 | 20.55 | 39.10 | 57.47 | 3.43 | 3RbCl.2HgCl ₂ .2H ₂ O and RbCl.HgCl ₂ .H ₂ O |
| 27.38 | 20.63 | 38.67 | 57.40 | 3.93 | |
| 26.83 | 20.87 | 38.48 | 57.36 | 4.16 | RbCl.HgCl ₂ .H ₂ O Calc. Composition 20.40% RbCl, 66.11% HgCl ₂ , 4.40% H ₂ O |
| 27.09 | 20.97 | 31.40 | 64.35 | 4.25 | |
| 26.15 | 20.58 | 30.34 | 65.48 | 4.18 | 3RbCl.4HgCl ₂ .H ₂ O Calc. Composition 24.76% RbCl, 74.01% HgCl ₂ , 1.23% H ₂ O |
| 23.81 | 18.71 | 30.87 | 65.10 | 4.03 | |
| 18.10 | 14.25 | 29.87 | 65.28 | 4.85 | RbCl.HgCl ₂ .H ₂ O and 3RbCl 4HgCl ₂ .H ₂ O |
| 10.87 | 10.42 | 29.33 | 66.15 | 4.52 | |
| 10.68 | 10.56 | 28.59 | 67.99 | 3.42 | 3RbCl.4HgCl ₂ .H ₂ O and RbCl 5HgCl ₂ |
| 10.06 | 10.05 | 26.22 | 72.20 | 1.58 | |
| 10.06 | 9.86 | 25.28 | 73.38 | 0.84 | RbCl.5HgCl ₂ Calc. Composition 8.20% RbCl, 91.8% HgCl ₂ |
| 8.48 | 8.71 | 25.30 | 73.15 | 1.55 | |
| 8.46 | 8.80 | 25.44 | 73.67 | 0.89 | RbCl.5HgCl ₂ Calc. Composition 8.20% RbCl, 91.8% HgCl ₂ |
| 5.68 | 8.70 | 25.09 | 73.46 | 1.45 | |
| 5.10 | 8.33 | 24.92 | 73.93 | 1.15 | RbCl.5HgCl ₂ Calc. Composition 8.20% RbCl, 91.8% HgCl ₂ |
| 3.43 | 8.25 | 22.79 | 75.72 | 1.49 | |
| 3.38 | 8.00 | 12.68 | 86.74 | 0.58 | RbCl.5HgCl ₂ Calc. Composition 8.20% RbCl, 91.8% HgCl ₂ |
| 2.98 | 7.71 | 8.40 | 91.24 | ... | |
| 1.89 | 7.64 | 8.38 | 91.78 | ... | RbCl.5HgCl ₂ Calc. Composition 8.20% RbCl, 91.8% HgCl ₂ |
| 1.50 | 7.55 | 8.30 | 91.81 | ... | |
| 1.10 | 7.21 | 8.07 | 91.58 | ... | RbCl.5HgCl ₂ and HgCl ₂ |
| 0.79 | 7.16 | 6.91 | 93.15 | ... | |
| 0.84 | 7.42 | 2.27 | 97.09 | ... | HgCl ₂ |
| none | 6.90 | none | 100.0 | ... | |

SOLUBILITY OF MERCURIC CHLORIDE IN METHYL, ETHYL, PROPYL,
n BUTYL, ISO BUTYL AND ALLYL ALCOHOLS.

(Etard — Ann. chim. phys. [7] 2, 563, '94.)

NOTE. — For the solubility in Me, Et, and propyl alcohols at room temperature, see Rohland — Z. anorg. Ch. **18**, 328, '98; at 8.5°, 20° and 38.2°, see Timofejew — Compt. rend. **112**, 1224, '91; in Me and Et alcohols at 25°, see de Bruyn — Z. physik. Ch. **10**, 783, '92. The determinations of these investigators agree well with those of Etard, which are given below.

| t°. | Grams HgCl ₂ per 100 Grams Saturated Solution in: | | | | | |
|-----|--|-----------------------------------|-----------------------------------|---|---|---|
| | CH ₃ OH. | C ₂ H ₅ OH. | C ₃ H ₇ OH. | CH ₃ (CH ₂) ₃ OH. | (CH ₃) ₂ CHCH ₂ OH. | CH ₃ CH(CH ₃)OH. |
| -30 | ... | 14.5 | 15.0 | ... | ... | ... |
| -20 | ... | 20.1 | 15.7 | 13.5 | ... | 21.0 |
| -10 | 15.2 | 26.5 | 16.5 | 13.7 | ... | 25.5 |
| 0 | 20.1 | 29.8 | 17.4 | 14.0 | 5.2 | 30.0 |
| +10 | 26.3 | 30.6 | 18.0 | 14.3 | 6.0 | 37.5 |
| 20 | 34.0 | 32.0 | 18.8 | 14.6 | 6.8 | 46.5 |
| 25 | 40.0 | 32.5 | 19.5 | 15.5 | 7.2 | ... |
| 30 | 44.4 | 33.7 | 20.0 | 16.5 | 7.5 | ... |
| 40 | 58.6 | 35.6 | 23.0 | 19.6 | 9.7 | ... |
| 60 | 62.5 | 41.2 | 29.8 | 26.5 | 17.0 | ... |
| 80 | 66.0 | 47.5 | 36.8 | 33.0 | 24.9 | ... |
| 100 | 70.1 | 54.3 | 43.8 | ... | 31.7 | ... |
| 120 | 73.5 | 61.5 | 50.6 | ... | 39.2 | ... |
| 150 | 78.5 | ... | ... | ... | ... | ... |

SOLUBILITY OF MERCURIC CHLORIDE IN ACETIC ACID.

(Etard.)

| t°. | Gms. HgCl ₂ per 100 Gms. Solution. | t°. | Gms. HgCl ₂ per 100 Gms. Solution. | t°. | Gms. HgCl ₂ per 100 Gms. Solution. |
|-----|--|-----|--|-----|--|
| 20 | 2.5 | 70 | 8.5 | 110 | 13.6 |
| 30 | 3.5 | 80 | 9.7 | 120 | 16.5 |
| 40 | 4.7 | 90 | 11.0 | 130 | 20.7 |
| 50 | 6.0 | 100 | 12.4 | 140 | 25.2 |
| 60 | 7.2 | | | 160 | 34.8 |

SOLUBILITY OF MERCURIC CHLORIDE AND SODIUM CHLORIDE IN ETHYL
ACETATE AT 40°.

(Linebarger — Am. Ch. J. **16**, 214, '94.)

| Mols. per 100 Mols. Acetate. | | Gms. per 100 Gms. Acetate. | | Gms. per 100 Gms. Solution. | | Solid Phase. |
|---------------------------------|---------------------|-------------------------------|---------------------|--------------------------------|---------------------|--------------------------|
| NaCl. | HgCl ₂ . | NaCl. | HgCl ₂ . | NaCl. | HgCl ₂ . | |
| 0.8 | 12.9 | 0.53 | 39.7 | 0.53 | 28.4 | HgCl ₂ |
| 2.3 | 12.4 | 1.53 | 38.15 | 1.51 | 27.61 | " |
| 4.3 | 16.4 | 2.85 | 50.44 | 2.78 | 33.54 | " |
| 9.1 | 22.85 | 6.05 | 86.14 | 5.60 | 46.28 | " |
| 18.5 | 34.9 | 12.29 | 107.4 | 10.95 | 51.76 | " |
| 20.0 | 40.0 | 13.29 | 123.0 | 11.73 | 55.18 | HgCl ₂ + NaCl |

The double salt (HgCl₂)₂.NaCl is formed under proper conditions.

SOLUBILITY OF MERCURIC CHLORIDE IN ETHYL ACETATE AND IN ACETONE.

(Etard; von Laszcynski — Ber. 27, 2285, '94; Krug and McElroy — J. Anal. Ch. 6, 186, '92; Linebarger — Am. Ch. J. 16, 214, 94; Aten — Z. physik. Ch. 54, 121, '05.)

NOTE. — The results obtained by the above named investigators were calculated to a common basis and plotted on cross-section paper. The variations which were noted could not be satisfactorily harmonized, and therefore all the results are included in the following table.

SOLUBILITY.

In Ethyl Acetate.

In Acetone.

| t° | Grams HgCl ₂ per 100 Grams Solution. | | | | Gms. HgCl ₂ per 100 Gms. Solution. | | | |
|-----|---|-------|-------------|--------|---|-------------|---------------|--------|
| | Laszcynski. | Aten. | Linebarger. | Etard. | K and McE. | Laszcynski. | Aten. | Etard. |
| -10 | ... | 23.0 | ... | 40 | ... | ... | 44.0 * | 57.0 |
| 0 | 22.0 | 23.2 | 32.0 | 40 | ... | 49.7 | 43.0 * | 61.7 |
| +10 | 22.2 | 23.5 | 32.5 | 40 | ... | 52.0 | 51.0 *-58.9 † | 61.7 |
| 20 | 22.5 | 23.4 | 32.7 | 40 | ... | 54 | 58.5 † | 61.7 |
| 25 | 22.7 | 23.5 | 33.0 | 40 | 37.4 | 55.2 | 58.2 † | 61.7 |
| 30 | 23.0 | ... | 33.2 | 40 | ... | ... | ... | 61.7 |
| 40 | 23.5 | ... | 33.5 | 40 | ... | ... | ... | 61.7 |
| 50 | 24.0 | ... | 33.5 | 41 | ... | ... | ... | 61.7 |
| 60 | 24.7 | ... | ... | 42.5 | ... | ... | ... | 61.7 |
| 80 | 26.0 | ... | ... | 45.2 | ... | ... | ... | 61.7 |
| 100 | ... | ... | ... | 48.0 | ... | ... | ... | ... |
| 120 | ... | ... | ... | 50.8 | ... | ... | ... | ... |
| 150 | ... | ... | ... | 55.0 | ... | ... | ... | ... |

(*) Solid phase HgCl₂(CH₃)₂CO.

(†) Solid Phase HgCl₂.

100 grams absolute acetone dissolve 143 grams HgCl₂ at 18°.

(Naumann — Ber. 37, 4332, '04.)

SOLUBILITY OF MERCURIC CHLORIDE IN SEVERAL SOLVENTS.

(Arctowski — Z. anorg. Ch. 6, 267, '94; von Laszcynski; Sulc. — Z. anorg. Ch. 25, 401, '00.)

In Carbon Bisulphide (A.).

In Benzene (von L.).

In Several Solvents at 18-20° (S.).

| t°. | Gms. HgCl ₂ per 100 Gms. Solution. | t°. | Gms. HgCl ₂ per 100 Gms. Solution. | Solvent. | Gms. HgCl ₂ per 100 Gms. Solvent. |
|-----|---|-----|---|---|--|
| -10 | 0.010 | 15 | 0.537 | CHBr ₃ | 0.486 |
| 0 | 0.018 | 41 | 0.616 | CHCl ₃ | 0.106 |
| 10 | 0.026 | 55 | 0.843 | CCl ₄ | 0.002 |
| 15 | 0.032 | 84 | 1.769 | C ₂ H ₅ Br | 2.010 |
| 20 | 0.042 | | | C ₂ H ₄ Br ₂ | 1.530 |
| 25 | 0.053 | | | | |
| 30 | 0.063 | | | | |

SOLUBILITY OF MERCURIC CHLORIDE IN ABSOLUTE ETHYL ETHER.

(Etard; Laszcynski; Köhler — Z. anal. Ch. 18, 242, '79.)

| t°. | Gms. HgCl ₂ per 100 Gms. Solution. | t°. | Gms. HgCl ₂ per 100 Gms. Solution. | t°. | Gms. HgCl ₂ per 100 Gms. Solution. |
|-----|--|-----|--|-----|--|
| -20 | 6.0 | 60 | 6.0 | 90 | 7.5 |
| 0 | 6.0 | 70 | 6.4 | 100 | 8.0 |
| 20 | 6.0 | 80 | 7.0 | 110 | 8.5 |

SOLUBILITY OF MERCURIC CHLORIDE AND OF DOUBLE MERCURIC AND TETRA METHYL AMINE CHLORIDE (CH₃)₄NCl.6HgCl₂ IN AQ. ETHER AT 17°.

(Strömhölm — J. pr. Ch. [2] 66, 443, '02; Z. physik. Chem. 44, 64, '03.)

| Molecular Concentration per Liter. | | | Grams per Liter of Solution. | | |
|------------------------------------|------------------------|------------------------|------------------------------|------------------------|------------------------|
| H ₂ O. | HgCl ₂ (*). | HgCl ₂ (†). | H ₂ O. | HgCl ₂ (*). | HgCl ₂ (†). |
| 0.0 | 0.1515 | 0.0342 | 0 | 41.16 | 9.26 |
| 0.0656 | 0.1795 | 0.0428 | 1.18 | 48.64 | 11.60 |
| 0.1311 | 0.2069 | 0.0516 | 2.36 | 56.08 | 14.00 |
| 0.1956 | 0.2339 | 0.0603 | 3.52 | 63.38 | 16.34 |
| 0.2611 | 0.2489 | 0.0690 | 4.70 | 70.16 | 18.70 |
| 0.3267 | 0.2849 | 0.0779 | 5.88 | 77.20 | 21.10 |
| 0.3922 | 0.3100 | 0.0866 | 7.06 | 84.02 | 23.48 |

(*) Results in this column are for solutions in contact with the Solid Phase HgCl₂. (†) Results in this column are for solutions in contact with the Solid Phase (CH₃)₄NCl.6HgCl₂.

SOLUBILITY OF MERCURIC CHLORIDE AND OF DOUBLE MERCURIC AND TETRA METHYL AMINE CHLORIDE IN ALCOHOL-ETHER SOLUTIONS AT 17°.

(Strömhölm.)

| Grams C ₂ H ₅ OH per Liter. | Grams HgCl ₂ (*) per Liter. | Grams HgCl ₂ (†) per Liter. |
|---|--|--|
| 0.0 | 41.16 | 9.26 |
| 4.58 | 50.00 | 11.87 |
| 9.16 | 58.76 | 14.38 |
| 13.74 | 66.96 | 16.90 |

SOLUBILITY OF DOUBLE MERCURIC CHLORIDES IN AQUEOUS AND PURE ETHER AT 16.6°.

(Strömhölm.)

| Mol. Conc. of HgCl ₂ per Liter of: | | | | Gms. HgCl ₂ per Liter of: | | | | Solid Phase. |
|---|----------------|----------------|----------------|--------------------------------------|----------------|----------------|----------------|---|
| Pure Ether. | Aq. Ether (1). | Aq. Ether (2). | Aq. Ether (3). | Pure Ether. | Aq. Ether (4). | Aq. Ether (5). | Aq. Ether (6). | |
| 0.1515 | 0.2387 | 0.2647 | 0.3196 | 41.04 | 64.69 | 71.71 | 86.58 | HgCl ₂ |
| 0.0673 | 0.0673 | 0.1293 | 0.1617 | 18.23 | 18.23 | 35.05 | 43.79 | (CH ₃ .CH ₃ .C ₂ H ₅) ₂ SCl.6HgCl ₂ |
| 0.0404 | 0.0720 | 0.0835 | 0.1034 | 10.95 | 19.51 | 22.61 | 28.01 | (CH ₃ .C ₂ H ₅ .CH ₃ .C ₂ H ₅) ₂ SCl.6HgCl ₂ |
| 0.0342 | ... | 0.0706 | ... | 9.26 | ... | 19.10 | ... | (CH ₃) ₄ NCl.6HgCl ₂ |
| 0.0264 | ... | 0.0568 | ... | 7.14 | ... | 15.39 | ... | (C ₂ H ₅) ₂ SCl.6HgCl ₂ |
| 0.0209 | 0.0400 | 0.0460 | 0.0594 | 5.66 | 10.83 | 12.48 | 16.10 | (CH ₃ .C ₂ H ₅) ₂ SCl.6HgCl ₂ |
| 0.0063 | ... | 0.0144 | ... | 1.70 | ... | 3.90 | ... | (CH ₃) ₂ .H ₂ NCl.2HgCl ₂ |

(1) containing 0.21055 mol. H₂O per liter. (2) 0.2756 mol. H₂O per liter. (3) 0.421 mol. H₂O per liter. (4) containing 3.79 gms. H₂O per liter. (5) 4.97 gms. H₂O per liter. (6) 7.59 gms. H₂O per liter.

DISTRIBUTION OF MERCURIC CHLORIDE BETWEEN WATER AND TOLUENE AT 24°.

(Brown — J. Physic. Ch. 2, 50, '98.)

| Gms. HgCl ₂ per 100 cc. | | Gms. HgCl ₂ per 100 cc. | |
|------------------------------------|--|------------------------------------|--|
| H ₂ O Layer. | C ₆ H ₅ CH ₃ Layer. | H ₂ O Layer. | C ₆ H ₅ CH ₃ Layer. |
| 0.442 | 0.0270 | 1.816 | 0.130 |
| 0.732 | 0.0488 | 3.766 | 0.292 |
| 0.780 | 0.0542 | 3.754 | 0.298 |
| 1.192 | 0.0812 | 6.688* | 0.528* |

* This solution saturated.

MERCUROUS CHLORIDE HgCl.

One liter water dissolves 0.002 gram HgCl at 18°, by conductivity method.

(Kohlrausch — Z. physik. Ch. 50, 356, '04-'05.)

SOLUBILITY OF MERCUROUS CHLORIDE (CALOMEL) IN AQUEOUS SOLUTIONS OF SODIUM CHLORIDE, BARIUM CHLORIDE, CALCIUM CHLORIDE AND OF HYDROCHLORIC ACID AT 25°.

(Richards and Archibald — Proc. Am. Acad. 37, 345, '01-'02.)

Solid phase in each case. Calomel + about 0.1 gram of mercury.

In Aqueous NaCl.

| Sp. Gr. of Solutions. | Grams per Liter. | |
|-----------------------|------------------|---------------------|
| | NaCl. | HgCl ₂ . |
| ... | 5.85 | 0.0041 |
| 1.040 | 58.50 | 0.041 |
| 1.078 | 119.00 | 0.129 |
| 1.093 | 148.25 | 0.194 |
| 1.142 | 222.3 | 0.380 |
| 1.188 | 292.5 | 0.643 |

In Aqueous BaCl₂.

| Sp. Gr. of Solutions. | Grams per Liter. | |
|-----------------------|---------------------|---------------------|
| | BaCl ₂ . | HgCl ₂ . |
| 1.088 | 104.15 | 0.044 |
| 1.134 | 156.22 | 0.088 |
| 1.174 | 208.30 | 0.107 |
| 1.263 | 312.45 | 0.231 |

In Aqueous CaCl₂.

| Sp. Gr. of Solutions. | Grams per Liter. | |
|-----------------------|---------------------|---------------------|
| | CaCl ₂ . | HgCl ₂ . |
| ... | 39.96 | 0.022 |
| ... | 55.5 | 0.033 |
| 1.064 | 111.0 | 0.081 |
| 1.105 | 138.75 | 0.118 |
| 1.151 | 195.36 | 0.231 |
| 1.205 | 257.52 | 0.322 |
| 1.243 | 324.67 | 0.430 |
| 1.315 | 432.9 | 0.518 |
| 1.358 | 499.5 | 0.510 |

In Aqueous HCl.

| Sp. Gr. of Solutions. | Grams per Liter. | |
|-----------------------|------------------|---------------------|
| | HCl. | HgCl ₂ . |
| ... | 31.69 | 0.034 |
| ... | 36.46 | 0.048 |
| 1.042 | 95.43 | 0.207 |
| 1.069 | 158.4 | 0.399 |
| 1.091 | 209.2 | 0.548 |
| 1.114 | 267.3 | 0.654 |
| 1.119 | 278.7 | 0.675 |
| 1.132 | 317.3 | 0.670 |
| 1.153 | 364.6 | 0.673 |

 100 grams bromoform, CHBr₃, dissolve 0.055 gram HgCl at 18°-20°.

(Sulc. — Z. anorg. Ch. 25, 401, '00.)

MERCURIC CYANIDE $\text{Hg}(\text{CN})_2$.

SOLUBILITY IN SEVERAL SOLVENTS.

| Solvent. | t°. | Gms. $\text{Hg}(\text{CN})_2$ per 100 Gms. Solvent. | Observer. |
|---------------------|-------|--|---|
| Water | -0.45 | about 11.0 | (Guthrie — Phil. Mag. [5] 6, 40, '78.) |
| " | 15.2 | 8.0 | (Wittstein.) |
| " | 101.1 | 53.85 | (Griffiths.) |
| Abs. Ethyl Alcohol | 19.5 | 10.1 | (de Bruyn — Z. physik. Ch. 10, 784, '92.) |
| Abs. Methyl Alcohol | 19.5 | 44.2 | " |
| Glycerine | 15.5 | 27.0 | " |

SOLUBILITIES OF MERCURIC CYANIDE DOUBLE SALTS IN WATER AND IN ALCOHOL.

| Double Salt. | t°. | Gms. per 100 Grams. | | Observer. |
|---|---------|---------------------|-------------------|----------------------------------|
| | | Water. | Alcohol. | |
| $\text{Hg}(\text{CN})_2 \cdot 2\text{KCN}$ | cold | 22.7 | ... | |
| $\text{Hg}(\text{CN})_2 \cdot 2\text{TiCN}$ | 1° | 12.6 | ... | (Frommuller — Ber. 11, 92, '78.) |
| $\text{Hg}(\text{CN})_2 \cdot 2\text{TiCN}$ | 10° | 9.7 | ... | " |
| $2\text{Hg}(\text{CN})_2 \cdot \text{CaBr}_2 \cdot 5\text{H}_2\text{O}$ | cold | 100.0 | 50.0 | (Custer.) |
| $2\text{Hg}(\text{CN})_2 \cdot \text{CaBr}_2 \cdot 5\text{H}_2\text{O}$ | boiling | 400.0 | 100.0 | " |
| $\text{Hg}(\text{CN})_2 \cdot \text{KCl} \cdot \text{H}_2\text{O}$ | 18° | 14.81 | ... | (Brett.) |
| $\text{Hg}(\text{CN})_2 \cdot \text{KBr} \cdot 2\text{H}_2\text{O}$ | 18° | 7.49 | ... | " |
| $\text{Hg}(\text{CN})_2 \cdot \text{KBr} \cdot 2\text{H}_2\text{O}$ | boiling | 100.0+ | ... | " |
| $\text{Hg}(\text{CN})_2 \cdot \text{BaI}_2 \cdot 4\text{H}_2\text{O}$ | cold | 6.42 | 4.42 | (Custer.) |
| $\text{Hg}(\text{CN})_2 \cdot \text{BaI}_2 \cdot 4\text{H}_2\text{O}$ | boiling | 250.0 | 62.5 (90% Alc.) | " |
| $\text{Hg}(\text{CN})_2 \cdot \text{KI}$ | cold | 6.2 | 1.04 (34° B Alc.) | (Caillot.) |
| $\text{Hg}(\text{CN})_2 \cdot \text{NaI} \cdot 2\text{H}_2\text{O}$ | 18° | 22.2 | 15.4 (90% Alc.) | (Custer.) |
| $\text{Hg}(\text{CN})_2 \cdot \text{SrI}_2 \cdot 6\text{H}_2\text{O}$ | 18° | 14.3 | 25.0 (90% Alc.) | " |

SOLUBILITY OF MERCURIC CYANIDE IN ORGANIC SOLVENTS
AT 18°-20°.

(Sulc — Z. anorg. Ch. 25, 401, '00.)

| Solvent. | Formula. | G. $\text{Hg}(\text{CN})_2$ per 100 Gms. Solvent. |
|-----------------------|-----------------------------------|--|
| Bromoform | CHBr_3 | 0.005 |
| Carbon Tetra Chloride | CCl_4 | 0.001 |
| Ethyl Bromide | $\text{C}_2\text{H}_5\text{Br}$ | 0.013 |
| Ethylene Di Bromide | $\text{C}_2\text{H}_4\text{Br}_2$ | 0.001 |

MERCURY FULMINATE $\text{C}_2\text{HgN}_2\text{O}_2$.One liter of water dissolves 1.738 - 1.784 grams $\text{C}_2\text{HgN}_2\text{O}_2$ at 12°.

(Holleman — Rec. trav. chim. 15, 159, '96.)

MERCURIC IODIDE HgI_2 .

SOLUBILITY IN WATER.

| t°. | Grams HgI_2 per Liter. | Observer. |
|------|---------------------------------|---|
| 18 | 0.0004 (conductivity method) | (Kohlrausch — Z. physik. Ch. 50, 356, '04-'05.) |
| 17.5 | 0.040 | (Bourgoin — Bull. soc. chim. [2] 42, '84.) |
| 22 | 0.054 | (Rohland — Z. anorg. Ch. 18, 328, '98.) |

SOLUBILITY OF MERCURIC IODIDE IN ALCOHOLS.

| Alcohol. | Formula. | t°. | Sp. Gr. of Solution. | G. HgI ₂ per 100 Gms. Alcohol. | Observer. |
|------------|--|------------------|----------------------|---|-------------------|
| Methyl | CH ₃ OH | 15-20 | 0.799 | 3.24 | (Rohland.) |
| " | " | 19.5 | ... | 3.16 | (de Bruyn.) |
| " | " | 66 (b. pt.) | ... | 6.512 | (Sulc.) |
| Ethyl | C ₂ H ₅ OH | 15-20 | 0.810 | 1.42 | (Rohland.) |
| " | " | 18 | ... | 1.48 | (Bourgoin.) |
| " | " | 19.5 | ... | 2.09 | (de Bruyn.) |
| " | " | 25 | 0.803 | 2.19 | (Herz and Knoch.) |
| " | " | 78 (b. pt.) | ... | 4.325 | (Sulc.) |
| Propyl | C ₃ H ₇ OH | 15-20 | 0.816 | 0.826 | (Rohland.) |
| Amyl | C ₅ H ₁₁ OH | 13 | ... | 0.66 | (Laszcynski.) |
| " | " | 71 | ... | 3.66 | " |
| " | " | 100 | ... | 5.30 | " |
| " | " | 133.5 | ... | 9.57 | " |
| Iso Propyl | (CH ₃) ₂ CH.OH | 81 (b. pt.) | ... | 2.266 | (Sulc.) |
| Iso Butyl | (CH ₃) ₂ CHCH ₂ OH | 105-107 (b. pt.) | ... | 2.433 | " |

SOLUBILITY OF MERCURIC IODIDE IN AQUEOUS ETHYL ALCOHOL:

| At 18°. | | At 25°. | | | |
|---------------------------------|----------------------------------|--|--|--------|------------------------------|
| (Bourgoin.) | | (Herz and Knoch — Z. anorg. Ch. 45, 266, '05.) | | | |
| Solvent. | Gms. HgI ₂ per Liter. | Wt. % Alcohol in Solvent. | HgI ₂ per 100 cc. Solution. | | Sp. Gr. of Solutions 25°/4°. |
| | | | Millimols. | Grams. | |
| Abs. Alcohol | 11.86 | 100 | 3.86 | 1.754 | 0.8033 |
| H ₂ O + 80% 90° Alc. | 2.857 | 95.82 | 2.56 | 1.162 | 0.8095 |
| H ₂ O + 10% 90° Alc. | 0.086 | 92.44 | 1.92 | 0.873 | 0.8154 |
| | | 86.74 | 1.38 | 0.623 | 0.8300 |
| | | 78.75 | 0.935 | 0.425 | 0.8405 |
| | | 67.63 | 0.45 | 0.204 | 0.8721 |

SOLUBILITY OF MERCURIC IODIDE IN ACETONE IN ETHYL ACETATE AND IN BENZENE.

(Sulc; Krug and McElroy — J. Anal. Ch. 6, 186, '92; Laszcynski — Ber. 27, 2285, '94.)

| In Acetone. | | In Ethyl Acetate. | | In Benzene. | |
|-------------|--|-------------------|---|-------------|--|
| t°. | Gms. HgI ₂ per 100 Gms. (CH ₃) ₂ CO. | t°. | Gms. HgI ₂ per 100 Gms. CH ₃ COOC ₂ H ₅ . | t°. | Gms. HgI ₂ per 100 Gms. C ₆ H ₆ . |
| — 1 | 2.83 | — 20 | 1.49 | 15 | 0.22 |
| 18 | 3.36 | + 17.5 | 1.56 | 60 | 0.88 |
| 25 | 2.09 (K. and McE.) | 21 | 1.64 | 65 | 0.95 |
| 40 | 4.73 | 40 | 2.53 | 84 | 1.24 |
| 58 | 6.07 | 55 | 3.19 | 80 (b.pt.) | 0.825 (Sulc.) |
| 56 (b.pt.) | 3.249 (Sulc.) | 76 | 4.31 | | |

74-78 (b.pt.) 4.20 (Sulc.)

SOLUBILITY OF MERCURIC IODIDE IN CARBON BISULPHIDE.

(Linebarger — Am. Ch. J. 16, 214, '94; Arctowski — Z. anorg. Ch. 6, 267, '94; 11, 274, '95.)

| t°. | Gms. HgI ₂ per 100 Gms. Solution. | t°. | Gms. HgI ₂ per 100 Gms. Solution. | t°. | Gms. HgI ₂ per 100 Gms. Solution. |
|-------|---|-----|---|-----|---|
| -116 | 0.017 | -5 | 0.141 | 15 | 0.271 |
| -93 | 0.023 | 0 | 0.173 | 20 | 0.320 |
| -86.5 | 0.024 | +5 | 0.207 | 25 | 0.382 |
| -10 | 0.107 | 10 | 0.239 | 30 | 0.445 |

SOLUBILITY OF MERCURIC IODIDE IN SEVERAL ORGANIC SOLVENTS.

(Sulc — Z. anorg. Ch. 25, 401, '00.)

| Solvent. | Formula. | t°. | Gms. HgI ₂ per 100 Gms. Solvent. |
|----------------------|--|----------------|--|
| Chloroform | CHCl ₃ | 18-20 | 0.040 |
| Chloroform | CHCl ₃ | 61 (b. pt.) | 0.163 |
| Bromoform | CHBr ₃ | 18-20 | 0.486 |
| Tetra Chlor Methane | CCl ₄ | 18-20 | 0.006 |
| Tetra Chlor Methane | CCl ₄ | 75 (b. pt.) | 0.094 |
| Ethyl Bromide | C ₂ H ₅ Br | 18-20 | 0.643 |
| Ethyl Bromide | C ₂ H ₅ Br | 38° (b. pt.) | 0.773 |
| Ethylene Di Bromide | C ₂ H ₄ Br ₂ | 18-20 | 0.748 |
| Ethyl Iodide | C ₂ H ₅ I | 18-20 | 2.041 |
| Ethylene Di Chloride | C ₂ H ₄ Cl ₂ | 85.5° (b. pt.) | 1.200 |
| Iso Butyl Chloride | (CH ₃) ₂ CHCH ₂ Cl | 69 | 0.328 |
| Methyl Formate | HCOOCH ₃ | 36-38 | 1.166 |
| Ethyl Formate | HCOOC ₂ H ₅ | 52-55 | 2.150 |
| Methyl Acetate | CH ₃ COOCH ₃ | 56-59 | 2.500 |
| Acetal | CH ₃ CH(OC ₂ H ₅) ₂ | 105 | 3.000 |
| Epi Chlor Hydrine | CH ₂ .O.CH.CH ₂ Cl | 117 | 6.113 |
| Hexane | C ₆ H ₁₄ | 67 ... | 0.072 |

SOLUBILITY OF MERCURIC IODIDE IN ETHER AND IN METHYLENE IODIDE.

| In Ether. (Sulc; Laszcynski.) | | In Methylene Iodide. (Retgers — Z. anorg. Ch. 3, 253, '93.) | |
|----------------------------------|--|--|--|
| t°. | Gms. HgI ₂ per 100 Gms. (C ₂ H ₅) ₂ O. | t°. | Gms. HgI ₂ per 100 Gms. CH ₂ I ₂ . |
| 0 | 0.62 | 15 | 2.5 |
| 36 | 0.97 | 100 | 16.6 |
| 35 (b. pt.) | 0.47 (Sulc) | 180 | 58.0 |

SOLUBILITY OF MERCURIC IODIDE IN FATTY BODIES.

(Mehu — J. pharm. chim. [5] 12, 240, '85.)

| Solvent. | t°. | Gms. HgI ₂ per 100 Gms. Solvent. | Solvent. | t°. | Gms. HgI ₂ per 100 Gms. Solvent. |
|-------------------|-----|--|-------------|-----|--|
| Bitter Almond Oil | 25 | 0.5 | Vaseline | 25 | 0.025 |
| Bitter Almond Oil | 100 | 1.3 | Vaseline | 100 | 0.20 |
| Castor Oil | 25 | 4.0 | Poppy Oil | 25 | 1.0 |
| Castor Oil | 100 | 20.0 | Olive Oil | 25 | 0.4 |
| Nut Oil | 100 | 1.3 | Phenic Acid | 100 | 2.0 |

100 grams oil of bitter almonds dissolve 5.0 grams HgI₂.KI at 25°.
(Mehu.)

MERCURY OXIDE HgO .

SOLUBILITY IN WATER.
(Schick — Z. physik. Ch. 42, 163, '01-'02.)

| t°. | Grams per 1000 cc. Solution. | |
|-----|------------------------------|-------------------------|
| | | |
| 25 | 0.0518 yellow HgO | 0.0513 red HgO |
| 100 | 0.410 yellow HgO | 0.379 red HgO |

EQUILIBRIUM IN THE SYSTEM, MERCURY OXIDE, SULPHUR TRI-OXIDE, WATER.

(Hoitsema — Z. physik. Chem. 17, 651, '95.)

Results expressed in molecules per sum of 100 molecules of the three components of the system.

| Results at 25°. | | | | Results at 50°. | | | |
|-----------------|-----------------|----------------|--|-----------------|-----------------|----------------|---|
| Liquid Phase. | | | Solid Phase. | Liquid Phase. | | | Solid Phase. |
| HgO . | SO_2 . | HgO . | | HgO . | SO_2 . | HgO . | |
| 98.5 | 1.24 | 0.33 | $3\text{HgO} \cdot \text{SO}_2$ | 98.9 | 0.96 | 0.17 | $3\text{HgO} \cdot \text{SO}_2$ |
| 96.6 | 2.49 | 0.92 | " | 96.0 | 3.05 | 0.93 | " |
| 94.4 | 3.93 | 1.65 | " | 93.2 | 4.92 | 1.90 | " |
| 93.9 | 4.24 | 1.85 | $3\text{HgO} \cdot \text{SO}_2$ and $3\text{HgO} \cdot 2\text{SO}_2 \cdot 2\text{H}_2\text{O}$ | 92.8 | 5.10 | 2.09 | " |
| 94.4 | 4.52 | 2.12 | | 92.8 | 5.16 | 2.06 | " |
| 93.4 | 4.65 | 1.94 | $3\text{HgO} \cdot 2\text{SO}_2 \cdot \text{H}_2\text{O}$ | 92.5 | 5.34 | 2.12 | " |
| 92.9* | 4.81 | 2.29 | $3\text{HgO} \cdot \text{SO}_2$ | 92.2 | 5.57 | 2.20 | $3\text{HgO} \cdot \text{SO}_2$ and $3\text{HgO} \cdot 2\text{SO}_2 \cdot \text{H}_2\text{O}$ |
| 92.9 | 5.11 | 1.98 | $3\text{HgO} \cdot 2\text{SO}_2 \cdot \text{H}_2\text{O}$ | 92.1 | 5.75 | 2.11 | $3\text{HgO} \cdot 2\text{SO}_2 \cdot \text{H}_2\text{O}$ |
| 92.3* | 5.20 | 2.54 | $3\text{HgO} \cdot \text{SO}_2$ | 92.0 | 5.80 | 2.16 | " |
| 92.3 | 5.58 | 2.09 | $3\text{HgO} \cdot 2\text{SO}_2 \cdot \text{H}_2\text{O}$ | 91.2* | 6.27 | 2.56 | $3\text{HgO} \cdot \text{SO}_2$ and $\text{HgO} \cdot \text{SO}_2$ |
| 92.1 | 5.81 | 2.08 | " | 91.5 | 6.34 | 2.19 | $3\text{HgO} \cdot 2\text{SO}_2 \cdot \text{H}_2\text{O}$ and $\text{HgO} \cdot \text{SO}_2$ |
| 91.9 | 5.97 | 2.90 | $3\text{HgO} \cdot \text{SO}_2$ | 91.3* | 6.37 | 2.30 | $\text{HgO} \cdot \text{SO}_2$ |
| 91.9 | 6.15 | 2.05 | $3\text{HgO} \cdot 2\text{SO}_2 \cdot \text{H}_2\text{O}$ | 91.6 | 6.69 | 1.75 | " |
| 91.3 | 6.54 | 2.13 | " | 91.1 | 8.32 | 0.57 | " |
| 91.2 | 6.77 | 2.02 | $\text{HgO} \cdot \text{SO}_2 \cdot \text{H}_2\text{O}$ | 89.6 | 10.2 | 0.23 | " |
| 91.3 | 6.90 | 1.80 | " | 31.6 | 68.4 | 0.03 | " |
| 91.3 | 7.67 | 1.01 | " | | | | |
| 91.3 | 7.84 | 0.89 | $\text{HgO} \cdot \text{SO}_2 \cdot \text{H}_2\text{O}$ and $\text{HgO} \cdot \text{SO}_2$ | | | | |
| 91.0 | 8.36 | 0.69 | | | | | |
| 90.5 | 8.95 | 0.53 | $\text{HgO} \cdot \text{SO}_2$ | | | | |
| 89.2 | 10.6 | 0.22 | " | | | | |
| 75.8 | 24.2 | trace | " | | | | |
| 39.2 | 60.7 | trace | " | | | | |

* Indicates unstable equilibrium.

MERCUROUS SULPHATE Hg_2SO_4 .

SOLUBILITY IN WATER, IN SULPHURIC ACID AND IN POTASSIUM SULPHATE AT 25°.

(Drucker — Z. anorg. Ch. 28, 362, '01; Wright and Thomson — Phil. Mag. [5] 17, 288; 29, 1, '84-'85; Wilsmore — Z. physik. Ch. 35, 305, '00.)

| Solvent. | Hg_2SO_4 per Liter. | |
|--|-------------------------------------|-----------------------------------|
| | Gram Mols. | Grams. |
| Water | 11.71 10^{-4} | 0.058 (0.047 W. and T., 0.039 W.) |
| Aq. H_2SO_4 (1.96 gms. per liter) | 8.31 | 0.041 |
| Aq. H_2SO_4 (4.90 gms. per liter) | 8.78 | 0.044 |
| Aq. H_2SO_4 (9.80 gms. per liter) | 8.04 | 0.040 |
| Aq. K_2SO_4 (34.87 gms. per liter) | 9.05 | 0.045 |

METHANE CH₄.

SOLUBILITY IN WATER.

(Winkler — Ber. 34, 1418, '01.)

| t°. | β. | β'. | q. | t°. | β. | β'. | q. |
|-----|---------|---------|---------|-----|---------|---------|---------|
| 0 | 0.05563 | 0.05530 | 0.00396 | 40 | 0.02369 | 0.02198 | 0.00159 |
| 5 | 0.04805 | 0.04764 | 0.00341 | 50 | 0.02134 | 0.01876 | 0.00136 |
| 10 | 0.04177 | 0.04127 | 0.00296 | 60 | 0.01954 | 0.01571 | 0.00115 |
| 15 | 0.03690 | 0.03628 | 0.00260 | 70 | 0.01825 | 0.01265 | 0.00093 |
| 20 | 0.03308 | 0.03233 | 0.00232 | 80 | 0.01770 | 0.00944 | 0.00070 |
| 25 | 0.03006 | 0.02913 | 0.00209 | 90 | 0.01735 | 0.00535 | 0.00040 |
| 30 | 0.02762 | 0.02648 | 0.00191 | 100 | 0.01700 | 0.00000 | 0.00000 |

For the values of β, β' and q see Ethane, page 133.

SOLUBILITY OF METHANE IN METHYL ALCOHOL AND IN ACETONE.

(Levi — Gazz. chim. ital. II, 513, '01; abs. in Z. physik. Ch. 41, 110, '02.)

In methyl alcohol *l* (Ostwald expression, see page 105) = 0.5644 — 0.0046 *t* — 0.00004 *t*².In acetone *l* (Ostwald expression) = 0.5906 — 0.00613 *t* — 0.0000146 *t*².

From which is calculated the following values:

| In Methyl Alcohol. | | | | In Acetone. | | | |
|--------------------|------------|-----|------------|-------------|------------|-----|------------|
| t°. | <i>l</i> . | t°. | <i>l</i> . | t°. | <i>l</i> . | t°. | <i>l</i> . |
| 0 | 0.5644 | 40 | 0.3164 | 0 | 0.5906 | 40 | 0.3220 |
| 10 | 0.5144 | 50 | 0.2344 | 10 | 0.5278 | 50 | 0.2476 |
| 20 | 0.4564 | 60 | 0.1444 | 20 | 0.4622 | 60 | 0.1702 |
| 30 | 0.3904 | 70 | 0.0464 | 30 | 0.3936 | 70 | 0.0900 |

Tetra Chlor **METHANE** CCl₄ (Carbon Tetra Chloride).

SOLUBILITY IN WATER.

(Rex — Z. physik. Chem. 55, 355, '06.)

| t°. | 0°. | 10°. | 20°. | 30°. |
|--|-------|-------|-------|-------|
| Grams CCl ₄ per 100 gms. H ₂ O | 1.097 | 0.083 | 0.080 | 0.085 |

Tri Phenyl **METHANE** CH(C₆H₅)₃.

SOLUBILITY IN ANILIN.

(Hartley and Thomas — J. Ch. Soc. 89, 1026, '06.)

By synthetic method, see page 9.

| t°. | Gms. CH(C ₆ H ₅) ₃ per 100 Gms. Solution. | Mol. per cent CH(C ₆ H ₅) ₃ . | Solid Phase. | t°. | Gms. CH(C ₆ H ₅) ₃ per 100 Gms. Solution. | Mol. per cent CH(C ₆ H ₅) ₃ . | Solid Phase. |
|------|---|---|---|------|---|---|---|
| 23.0 | 5.4 | 1.85 | CH(C ₆ H ₅) ₃ .C ₆ H ₅ NH ₂ rhombs | 71.3 | 67.9 | 44.6 | CH(C ₆ H ₅) ₃ .C ₆ H ₅ NH ₂ rhombs |
| 35.3 | 9.5 | 3.8 | " | 71.6 | 71.7 | 49.1 | " |
| 43.0 | 13.5 | 5.6 | " | 71.2 | 76.3 | 55.1 | " |
| 52.1 | 21.9 | 9.7 | " | 70.6 | 78.3 | 57.9 | " |
| 61.4 | 36.5 | 17.8 | " | 71.6 | 82.1 | 63.5 | CH(C ₆ H ₅) ₃ monoclinic. |
| 66.0 | 47.2 | 25.4 | " | 74.3 | 84.9 | 68.2 | " |
| 68.7 | 54.8 | 31.6 | " | 82.1 | 91.7 | 80.9 | " |
| 70.1 | 64.6 | 40.9 | " | 87.3 | 96.1 | 90.2 | " |

SOLUBILITY OF TRI PHENYL METHANE IN BENZENE.

(Linebarger — Am. Ch. J. 15, 45, '93.)

(Hartley and Thomas.)

| t°. | Gms. CH(C ₆ H ₅) ₃ per 100 Grams C ₆ H ₆ . | Solid Phase. | t°. | Gms. CH(C ₆ H ₅) ₃ per 100 Gms. Solution. | Mol. per cent CH(C ₆ H ₅) ₃ . | Solid Phase. |
|------|--|--|------|---|---|---|
| 3.9 | 3.90 | C ₆ H ₆ + CH(C ₆ H ₅) ₃ .C ₆ H ₆ | 33 | 12.6 | 4.4 | CH(C ₆ H ₅) ₃ .C ₆ H ₆ rhombs |
| 4.0 | 4.06 | CH(C ₆ H ₅) ₃ .C ₆ H ₆ | 49.4 | 24.0 | 8.8 | " |
| 12.5 | 5.18 | " | 65.6 | 38.9 | 17.2 | " |
| 16.1 | 6.83 | " | 73.8 | 57.5 | 30.2 | " |
| 19.4 | 7.24 | " | 77.1 | 67.4 | 39.7 | " |
| 23.1 | 8.95 | " | 77.9 | 76.3 | 50.7 | " |
| 37.5 | 10.48 | (C ₆ H ₅) ₃ CH.C ₆ H ₆ + CH(C ₆ H ₅) ₃ | 77.5 | 80.2 | 56.4 | " |
| 42.0 | 19.61 | CH(C ₆ H ₅) ₃ | 76.2 | 84.1 | 62.8 | " |
| 44.6 | 22.64 | " | 74.6 | 87.5 | 69.1 | CH(C ₆ H ₅) ₃ monoclinic |
| 50.1 | 30.64 | " | 76.0 | 89.0 | 72.2 | " |
| 55.5 | 40.51 | " | 78.8 | 90.5 | 75.3 | " |
| 71.0 | 140.00 | " | 82.3 | 93.1 | 81.3 | " |
| 76.2 | 319.67 | " | 86.6 | 95.7 | 87.8 | " |

SOLUBILITY OF TRI PHENYL METHANE IN CARBON BISULPHIDE.

(Etard — Ann. chim. phys. [7] 2, 570, '94; below -80°, Artowski — Z. anorg. Ch. 11, 273, '95.)

| t°. | Gms. CH(C ₆ H ₅) ₃ per 100 Gms. Solution. | t°. | Gms. CH(C ₆ H ₅) ₃ per 100 Gms. Solution. | t°. | Gms. CH(C ₆ H ₅) ₃ per 100 Gms. Solution. |
|--------|---|-----|---|-----|---|
| -113.5 | 0.98 | -40 | 7.5 | 40 | 63.7 |
| -102 | 1.24 | -20 | 13.7 | 50 | 72.4 |
| -91 | 1.56 | 0 | 25.8 | 60 | 78.6 |
| -83 | 1.91 | +10 | 38.7 | 70 | 85.6 |
| -60 | 3.4 | 20 | 43.2 | 80 | 92.2 |
| | | 30 | 52.9 | | |

SOLUBILITY OF TRI PHENYL METHANE IN HEXANE AND IN CHLOROFORM.

(Etard.)

| t°. | Gms. CH(C ₆ H ₅) ₃ per 100 Gms. Solution in: | | t°. | Gms. CH(C ₆ H ₅) ₃ per 100 Gms. Solution in: | |
|-----|--|-------------|-----|--|-------------|
| | Hexane. | Chloroform. | | Hexane. | Chloroform. |
| -50 | ... | 10.5 | 30 | 12.5 | 48.8 |
| -30 | 1.2 | 15.2 | 40 | 20.0 | 56.1 |
| -20 | 1.6 | 19.0 | 50 | 25.8 | 63.8 |
| -10 | 2.2 | 23.5 | 60 | 45.7 | 71.7 |
| 0 | 3.5 | 28.9 | 70 | 62.0 | 79.8 |
| +10 | 5.6 | 35.0 | 80 | 78.5 | 87.2 |
| 20 | 8.3 | 41.5 | 90 | 97.0 | ... |

SOLUBILITY OF TRI PHENYL METHANE IN PYRIDINE.

(Hartley and Thomas — J. Ch. Soc. 89, 1028, '06.)

Synthetic method used, see note, page 9.

| t°. | Gms. CH(C ₆ H ₅) ₃ per 100 Gms. Solution. | Mol. per cent CH(C ₆ H ₅) ₃ . | Solid Phase. | t°. | Gms. CH(C ₆ H ₅) ₃ per 100 Gms. Solution. | Mol. per cent CH(C ₆ H ₅) ₃ . | Solid Phase. |
|------|--|--|---|------|--|--|---|
| 22.8 | 46.2 | 22.0 | CH(C ₆ H ₅) ₃ | 59.3 | 75.6 | 50.3 | CH(C ₆ H ₅) ₃ |
| 31.7 | 53.3 | 27.2 | " monoclinic | 67.8 | 81.9 | 59.7 | " |
| 37.9 | 57.6 | 30.7 | " | 72.8 | 85.7 | 66.4 | " |
| 48.7 | 66.6 | 39.5 | " | 80.6 | 91.5 | 77.2 | " |
| 53.1 | 70.1 | 43.5 | " | 86.8 | 95.8 | 88.1 | " |

SOLUBILITY OF TRI PHENYL METHANE IN:

(Hartley and Thomas.)

| Pyrrole. | | | | Thiophene. | | | |
|----------|---|--|---|------------|--|--|--|
| t°. | Gms. CH(C ₆ H ₅) ₃ per 100 Gms. Sol. | Mol. per cent CH(C ₆ H ₅) ₃ . | Solid Phase. | t°. | Gms. CH(C ₆ H ₅) ₃ per 100 Gms. Solution. | Mol. per cent CH(C ₆ H ₅) ₃ . | Solid Phase. |
| 24.6 | 24.3 | 8.1 | CH(C ₆ H ₅) ₃ .C ₄ H ₅ NH | 25.7 | 26.0 | 10.8 | CH(C ₆ H ₅) ₃ .C ₄ H ₅ S |
| 29.0 | 29.8 | 10.4 | " rhombs | 33.5 | 31.1 | 13.5 | " rhombs |
| 31.5 | 33.4 | 12.1 | " | 44.0 | 43.6 | 21.1 | " |
| 36.8 | 40.6 | 15.8 | CH(C ₆ H ₅) ₃ | 47.6 | 48.4 | 24.4 | " |
| 42.7 | 49.1 | 20.9 | " monoclinic | 53.5 | 58.7 | 32.9 | " |
| 46.9 | 56.0 | 25.9 | " | 57.4 | 70.2 | 44.7 | " |
| 53.2 | 63.9 | 32.8 | " | 57.6 | 74.8 | 50.6 | " |
| 60.0 | 72.3 | 41.8 | " | 62.7 | 78.7 | 56.0 | CH(C ₆ H ₅) ₃ |
| 63.9 | 76.7 | 47.4 | " | 67.0 | 81.9 | 60.8 | " monoclinic |
| 68.5 | 81.9 | 55.6 | " | 67.2 | 82.1 | 61.3 | " |
| 71.1 | 84.4 | 59.8 | " | 74.2 | 87.4 | 70.5 | " |
| 80.0 | 91.5 | 74.8 | " | 79.0 | 90.3 | 76.3 | " |
| 89.2 | 97.6 | 91.8 | " | 87.2 | 96.2 | 89.9 | " |

METHYL ACETATE, Butyrate and Propionate.

SOLUBILITY IN WATER AT 22°.

(Traube — Ber. 17, 2304, '84.)

100 grams H₂O dissolve 25.0 grams CH₃COOCH₃; 1.7 grams C₄H₇COOCH₃; 5.0 grams C₃H₇COOCH₃.

METHYL IODIDE, Methylene Chloride and Methylene Bromide.

SOLUBILITY OF EACH IN WATER.

(Rex — Z. physik. Chem. 55, 355, '06.)

| t°. | Grams per 100 Grams H ₂ O. | | |
|-----|---------------------------------------|-----------------------------------|-----------------------------------|
| | CH ₃ I. | CH ₂ Cl ₂ . | CH ₂ Br ₂ . |
| 0 | 1.565 | 2.363 | 1.173 |
| 10 | 1.446 | 2.122 | 1.146 |
| 20 | 1.419 | 2.000 | 1.148 |
| 30 | 1.429 | 1.969 | 1.176 |

METHYL BUTYRATE, METHYL VALERATE.

SOLUBILITY OF EACH IN AQUEOUS ALCOHOL MIXTURES.

(Bancroft — Phys. Rev. 3, 193, '95.)

100 cc. H₂O dissolve 1.15 cc. methyl butyrate at 20°.

| cc. Alcohol in Mixture. | cc. H ₂ O Added.* | | cc. Alcohol in Mixture. | cc. H ₂ O Added.* Valerate. |
|----------------------------|------------------------------|-----------|----------------------------|---|
| | Butyrate. | Valerate. | | |
| 3 | 2.34 | 1.66 | 27 | 41.15 |
| 6 | 6.96 | 5.06 | 30 | 52.37 |
| 9 | 12.62 | 9.03 | 33 | 62.25 |
| 12 | 19.45 | 13.40 | 36 | 74.15 |
| 15 | 28.13 | 18.41 | 39 | 91.45 |
| 18 | 33.80 | 24.00 | 42 | ∞ |
| 21 | 55.64 | 30.09 | | |
| 24 | ∞ | 36.72 | | |

* cc. H₂O added to cause the separation of a second phase in mixtures of the given amounts of ethyl alcohol and 3 cc. portions of methyl butyrate and of methyl valerate respectively.

METHYL ETHYL KETONE CH₃.CO.C₂H₅.

SOLUBILITY IN WATER.

(Rothmund — Z. physik. Chem. 26, 475, '98.)

By synthetic method, see Note, page 9.

| t°. | Gms. Ketone per 100 Gms. | | t°. | Gms. Ketone per 100 Gms. | |
|-----|--------------------------|---------------|---------------------|--------------------------|---------------|
| | Aq. Layer. | Ketone Layer. | | Aq. Layer. | Ketone Layer. |
| -10 | 34.5 | 89.7 | 90 | 16.1 | 84.8 |
| +10 | 26.1 | 90.0 | 110 | 17.7 | 80.0 |
| 30 | 21.9 | 89.9 | 130 | 21.8 | 71.9 |
| 50 | 17.5 | 89.0 | 140 | 26.0 | 64.0 |
| 70 | 16.2 | 85.7 | 151.8 (crit. temp.) | 44.2 | |

MOLYBDENUM TRIOXIDE MoO₃.100 gms. cold H₂O dissolve 0.187 gm. MoO₃.

(Dumas; Bucholz.)

100 gms. hot H₂O dissolve 0.104 gm. MoO₃.

(Hatchett.)

MORPHINE C₁₇H₁₉NO₃.H₂O.

SOLUBILITY IN SEVERAL SOLVENTS.

(U. S. P.; Müller — Apoth.-Ztg. 18, 257, '03.)

| Solvent. | Gms. Morphine per 100 Gms. Solution. | | | Solvent. | Gms. Morphine per 100 Gms. Solution. | |
|----------------------------------|--------------------------------------|---------|------------|-----------------------|--------------------------------------|-------------|
| | At 18°-22°. | At 25°. | At 80°. | | At 18°-22°. | At 25°. |
| Water | 0.0283 | 0.030 | 0.0961 | Chloroform | 0.0655 | 0.0555 |
| Alcohol | ... | 0.600 | 1.31 (60°) | Amyl Alcohol | ... | 0.8810 |
| Ether | 0.0131 | 0.0224 | ... | Ethyl Acetate | 0.1861 | 0.1905 |
| Ether sat. with H ₂ O | 0.0094 | ... | ... | Petroleum Ether | 0.0854 | ... |
| H ₂ O sat. with Ether | 0.0447 | ... | ... | Carbon Tetra Chloride | 0.0156 | 0.032 (17°) |
| Benzene | 0.0625 | ... | ... | Glycerine | 0.45 (15.5°) | ... |

SOLUBILITY OF MORPHINE IN AQUEOUS SOLUTIONS OF SALTS AND BASES AT ROOM TEMPERATURE, SHAKEN EIGHT DAYS.

(Dieterich — Pharm. Centr. 31, 395, '90.)

| Aq. Salt or Base. | In N/10 Salt or Base. | | In N/1 Salt or Base. | |
|---|-----------------------|------------|----------------------|-----------|
| | Grams per Liter. | | Grams per Liter. | |
| | Salt or Base. | Morphine. | Salt or Base. | Morphine. |
| NH ₄ OH | 3.51 | 0.20 | 35.08 | 0.505 |
| (NH ₄) ₂ CO ₃ | 4.80 | 0.031 | 48.03 | 0.040 |
| KOH | 4.62 | 2.78 | 46.16 | ... |
| K ₂ CO ₃ | 6.92 | 0.20 | 69.15 | 0.379 |
| KHCO ₃ | 10.02 | 0.024 | 100.16 | 0.040 |
| NaOH | 4.00 | 3.33 | 40.05 | ... |
| Na ₂ CO ₃ | 5.30 | 0.09 | 53.03 | 0.14 |
| NaHCO ₃ | 8.41 | 0.032 | 84.06 | 0.044 |
| Ca(OH) ₂ (sat.) | ... | 1.00 (25°) | ... | ... |

MORPHINE ACETATE CH₃COOH.C₁₇H₁₉NO₃.3H₂O, Morphine Hydrochloride HCl.C₁₇H₁₉NO₃.3H₂O, Morphine Sulphate H₂SO₄.(C₁₇H₁₉NO₃)₂.5H₂O, and Apo Morphine Hydrochloride HCl.C₁₇H₁₇NO₃.

SOLUBILITY IN SEVERAL SOLVENTS.

(U. S. P.)

| Solvent. | Grams per 100 Grams of Solvent. | | | | | | | |
|------------|---------------------------------|-------|----------------|-------|-----------|-------|-----------------------|------|
| | Acetate. | | Hydrochloride. | | Sulphate. | | Apo M. Hydrochloride. | |
| | 25°. | 80°. | 25°. | 80°. | 25°. | 80°. | 25°. | 80°. |
| Water | 44.9 | 50.0 | 5.81 | 200.0 | 6.53 | 166.6 | 2.53 | 6.25 |
| Alcohol | 4.6 | 40.0* | 2.4 | 2.8* | 0.22 | 0.53* | 2.62 | 3.33 |
| Chloroform | 0.21 | ... | ... | ... | ... | ... | 0.026 | ... |
| Ether | ... | ... | ... | ... | ... | ... | 0.053 | ... |
| Glycerine | 19.2 | ... | 20.0† | ... | ... | ... | ... | ... |

* 60°.

† 15.5°.

100 gms. H₂O dissolve 1.69 gms. apo morphine hydrochloride at 15.5°, and 2.04 gms. at 25°.

100 gms. 90% alcohol dissolve 1.96 gms. apo morphine hydrochloride at 25°.

(Dolt — Pharm. J. [4] 22, 345, '75.)

100 gms. H₂O dissolve 4.17 gms. morphine sulphate at 15°.

(Power — Am. J. Pharm. March, '82.)

- a NAPHTHYLAMINE** *p* Sulphonic Acid (Naphtion Acid), 1 : 4
 α $C_{10}H_7NH_2 \cdot SO_2H$ and α Naphthalamine *o* Sulphonic Acid, 1 : 2
 α $C_{10}H_6NH_2 \cdot SO_2H$.

SOLUBILITY OF EACH IN WATER.

(Dolinski — Ber. 38, 1836, '05.)

| t°. | Gms. per 100 Gms. H ₂ O. | | t°. | Gms. per 100 Gms. H ₂ O. | |
|-----|-------------------------------------|------------------------|-----|-------------------------------------|------------------------|
| | <i>p</i> Sulphonic Ac. | <i>o</i> Sulphonic Ac. | | <i>p</i> Sulphonic Ac. | <i>o</i> Sulphonic Ac. |
| 0 | 0.027 | 0.24 | 50 | 0.059 | 0.81 |
| 10 | 0.029 | 0.32 | 60 | 0.075 | 1.01 |
| 20 | 0.031 | 0.41 | 70 | 0.097 | 1.37 |
| 30 | 0.037 | 0.52 | 80 | 0.130 | 1.80 |
| 40 | 0.048 | 0.65 | 90 | 0.175 | 2.40 |
| | | | 100 | 0.228 | 3.19 |

NAPHTHALENE $C_{10}H_8$.

SOLUBILITY IN METHYL, ETHYL, AND PROPYL ALCOHOLS.

(Speyers — Am. J. Sci. [4] 14, 294, '02; at 19.5°, de Bruyn — Z. physik. Chem. 10, 784, '02; at 11°, Timofeiew — Compt. rend. 112, 1137, '91.)

The original results were calculated to a common basis, plotted on cross-section paper, and the following table read from the curves.

| t°. | In Methyl Alcohol. | | In Ethyl Alcohol. | | In Propyl Alcohol. | |
|-----|------------------------|--|------------------------|--|------------------------|--|
| | Wt. of 1 cc. Solution. | Gms. $C_{10}H_8$ per 100 Gms. CH_3OH . | Wt. of 1 cc. Solution. | Gms. $C_{10}H_8$ per 100 Gms. C_2H_5OH . | Wt. of 1 cc. Solution. | Gms. $C_{10}H_8$ per 100 Gms. C_3H_7OH . |
| 0 | 0.8194 | 3.48 | 0.8175 | 5.0 | 0.8285 | 4.45 |
| 10 | 0.812 | 5.6 | 0.814 | 7.0 | 0.824 | 5.6 |
| 20 | 0.807 | 8.2 | 0.810 | 9.8 | 0.821 | 8.2 |
| 25 | 0.805 | 9.6 | 0.809 | 11.3 | 0.820 | 9.6 |
| 30 | 0.804 | 11.2 | 0.809 | 13.4 | 0.820 | 11.4 |
| 40 | 0.805 | 16.2 | 0.812 | 19.5 | 0.823 | 16.4 |
| 50 | 0.813 | 26.0 | 0.822 | 35.0 | 0.837 | 26.0 |
| 60 | 0.837 | 50.0 | 0.855 | 67.0 | 0.867 | 50.0 |
| 65 | 0.870 | ... | 0.890 | 96.0 | 0.897 | 80.0 |
| 70 | 0.9023 (68°) | ... | 0.930 | 179.0 | 0.933 | 134.1 (68.5°) |

SOLUBILITY OF NAPHTHALENE IN AQUEOUS ACETONE.

(Cady — J. Physic. Ch. 2, 168, '98.)

| t°. | Grams per 100 Grams Solution. | | |
|------|-------------------------------|--------|--------------|
| | Acetone. | Water. | Naphthalene. |
| 65.5 | 10.0 | 89.92 | 0.05 |
| 55.3 | 19.91 | 80.0 | 0.09 |
| 45 | 29.92 | 69.67 | 0.41 |
| 38 | 40.81 | 58.22 | 0.97 |
| 32.2 | 48.67 | 48.68 | 2.65 |
| 28.5 | 57.43 | 36.64 | 5.93 |
| 28.2 | 60.43 | 25.75 | 13.82 |

The isotherms for intervals of 10° lie so close together that they are practically indistinguishable for the greater part of their length.

SOLUBILITY OF NAPHTHALENE IN:

| t°. | Chloroform. | Carbon Tetra Chloride. | | Carbon Di Sulphide. |
|-------|------------------------|---|--|--|
| | (Speyers; Etard.) | (Schröder — Z. physik. (Arctowski — Compt. Ch. 12, 457, '93.) | rend, 121, 123, '95; Etard.) | |
| | Wt. of 1 cc. Solution. | Gms. $C_{10}H_8$ per 100 Gms. $CHCl_3$. | Gms. $C_{10}H_8$ per 100 Gms. Sat. Solution. | Gms. $C_{10}H_8$ per 100 Gms. Sat. Solution. |
| — 108 | ... | ... | ... | 0.62 |
| — 82 | ... | ... | ... | 1.38 |
| — 50 | ... | ... | ... | 2.3 |
| — 30 | ... | 8.8 | ... | 6.6 |
| — 10 | ... | 15.6 | ... | 14.1 |
| 0 | 1.393 | 19.5 | 9.0 | 19.9 |
| + 10 | 1.355 | 25.5 | 14.0 | 27.5 |
| 20 | 1.300 | 31.8 | 20.0 | 36.3 |
| 25 | 1.280 | 35.5 | 23.0 | 41.0 |
| 30 | 1.255 | 40.1 | 26.5 | 46.0 |
| 40 | 1.205 | 49.5 | 35.5 | 57.2 |
| 50 | 1.150 | 60.3 | 47.5 | 67.6 |
| 60 | 1.090 | 73.1 | 62.5 | 79.2 |
| 70 | 1.040 | 87.2 | 80.0 | 90.3 |

NOTE. — Speyers' results upon the solubility of $C_{10}H_8$ in $CHCl_3$, when calculated to grams per 100 grams of solvent, agree quite well with Etard's (Ann. chim. phys. [7] 2 570, '94 figures, reported on the basis of grams $C_{10}H_8$ per 100 grams saturated solution.

SOLUBILITY OF NAPHTHALENE IN:

(Schröder; Etard; Speyers.)

| t°. | Benzene. | Chlor Benzene. | Hexane. | Toluene. | |
|------|---|---|---|------------------------|---|
| | Gms. $C_{10}H_8$ per 100 Gms. Solution. | Gms. $C_{10}H_8$ per 100 Gms. Solution. | Gms. $C_{10}H_8$ per 100 Gms. Solution. | Wt. of 1 cc. Solution. | Gms. $C_{10}H_8$ per 100 Gms. $C_6H_5.CH_3$. |
| — 50 | ... | ... | 0.3 | ... | ... |
| — 20 | ... | ... | 1.9 | ... | ... |
| 0 | ... | ... | 5.5 | 0.9124 | ... |
| + 10 | 27.5 | 24.0 | 9.0 | 0.9126 | 15.0 |
| 20 | 36.0 | 31.0 | 14.0 | 0.9135 | 28.0 |
| 25 | 40.5 | 35.0 | 17.5 | 0.9155 | 36.0 |
| 30 | 45.5 | 39.0 | 21.0 | 0.9180 | 42.0 |
| 40 | 54.0 | 48.0 | 30.8 | 0.9250 | 56.0 |
| 50 | 65.0 | 57.5 | 43.7 | 0.9350 | 69.5 |
| 60 | 77.5 | 70.5 | 60.6 | 0.9475 | 83.0 |
| 70 | 88.0 | 85.0 | 78.8 | 0.9640 | 97.5 |
| 80 | ... | ... | ... | 0.9770 | 111.0 |

B NAPHTHOIC ACID $C_{10}H_7COOH$.

One liter of aqueous solution contains 0.058 gram $C_{10}H_7COOH$ at 25°.

(Paul — Z. physik. Ch. 14, 111, '94.)

β NAPHTHOL

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β NAPHTHOL $C_{10}H_7OH$.

100 grams H_2O dissolve 0.105 gram at 25° , and 1.33 grams at b. pt.;
100 grams alcohol dissolve 164.0 grams at 25° .

NARCEINE.

100 grams pure carbon tetra chloride dissolve 0.011 gram narceine
at 17° .
(Schindelmeyer — Chem.-Ztg. 25, 129, '01.)

NEODYMIUM CHLORIDE $NdCl_3$.

100 grams H_2O dissolve 98.7 grams $NdCl_3$ at 13° , and 140.4 grams at
 100° .
(Matignon — Compt. rend. 133, 289, '01.)

NEODYMIUM SULPHATE $Nd_2(SO_4)_3$.**SOLUBILITY IN WATER.**

(Muthmann and Rolig — Ber. 31, 1728, '98.)

| t°. | Gms. $Nd_2(SO_4)_3$ per 100 Gms. | | t°. | Gms. $Nd_2(SO_4)_3$ per 100 Gms. | |
|-----|----------------------------------|--------|-----|----------------------------------|--------|
| | Solution. | Water. | | Solution. | Water. |
| 0 | 8.7 | 9.5 | 50 | 3.5 | 3.7 |
| 16 | 6.6 | 7.1 | 80 | 2.6 | 2.7 |
| 30 | 4.7 | 5.0 | 108 | 2.2 | 2.3 |

NICKEL BROMATE $Ni(BrO_3)_2 \cdot 6H_2O$.

100 grams cold water dissolve 27.6 grams nickel bromate.

NICKEL BROMIDE $NiBr_2$.**SOLUBILITY IN WATER.**

(Etard — Ann. chim. phys. [7] 2, 530, '94.)

| t°. | Gms. $NiBr_2$ per 100 Gms. Solution. | t°. | Gms. $NiBr_2$ per 100 Gms. Solution. | t°. | Gms. $NiBr_2$ per 100 Gms. Solution. |
|-----|--------------------------------------|-----|--------------------------------------|-----|--------------------------------------|
| -20 | 47.7 | 25 | 57.3 | 80 | 60.6 |
| -10 | 50.5 | 30 | 58.0 | 100 | 60.8 |
| 0 | 53.0 | 40 | 59.1 | 120 | 60.9 |
| +10 | 55.0 | 50 | 60.0 | 140 | 61.0 |
| 20 | 56.7 | 60 | 60.4 | | |

NICKEL CHLORATE $Ni(ClO_3)_2$.**SOLUBILITY IN WATER.**

(Meusser — Ber. 35, 1419, '02.)

| t°. | Gms. $Ni(ClO_3)_2$ per 100 Gms. Solution. | Mols. $Ni(ClO_3)_2$ per 100 Mols. H_2O . | Solid Phase. | t°. | Gms. $Ni(ClO_3)_2$ per 100 Gms. Solution. | Mols. $Ni(ClO_3)_2$ per 100 Mols. H_2O . | Solid Phase. |
|-----|---|--|---------------------------|-------|---|--|---------------------------|
| -18 | 49.55 | 7.84 | $Ni(ClO_3)_2 \cdot 6H_2O$ | 48 | 67.60 | 16.65 | $Ni(ClO_3)_2 \cdot 4H_2O$ |
| -8 | 51.52 | 8.49 | " | 55 | 68.78 | 17.59 | " |
| 0 | 52.66 | 8.88 | " | 65 | 69.05 | 18.01 | " |
| +18 | 56.74 | 10.47 | " | 79.5 | 75.50 | 24.68 | " |
| 40 | 64.47 | 15.35 | " | -13.5 | 31.85 | 3.73 | Ice |
| | | | | -9 | 26.62 | 2.90 | " |

Sp. Gr. of solution saturated at + 18 = 1.661.

NICKEL CHLORIDE NiCl_2 .

SOLUBILITY IN WATER.

(Etard; at 12°, Ditte — Compt. rend. 92, 242, '81.)

| t°. | Gms. NiCl_2 per 100 Gms. Solution. | t°. | Gms. NiCl_2 per 100 Gms. Solution. | t°. | Gms. NiCl_2 per 100 Gms. Solution. |
|-----|--|-----|--|-----|--|
| -17 | 29.7 | 25 | 40.0 | 60 | 45.1 |
| 0 | 35.0 | 30 | 40.8 | 70 | 46.0 |
| +10 | 37.3 | 40 | 42.3 | 78 | 46.6 |
| 20 | 39.1 | 50 | 43.9 | 100 | 46.7 |

1000 cc. sat. HCl solution dissolve 4.0 grams NiCl_2 at 12°.100 grams abs. alcohol dissolve 53.71 grams $\text{NiCl}_2 \cdot 6\text{H}_2\text{O}$ at room temperature.100 grams abs. alcohol dissolve 10.05 grams NiCl_2 at room temperature.

(Böttker — Z. physik. Chem. 22, 511, '97.)

100 grams abs. alcohol dissolve 2.16 grams $\text{NiCl}_2 \cdot 7\text{H}_2\text{O}$ at 17°, and 1.4 grams at 3°.

(de Bruyn — Rec. trav. chim. 11, 156, '92.)

100 grams saturated solution in glycol contain 16.2 grams NiCl_2 at room temperature.

(de Coninck — Bul. acad. roy. Belgique, 359, '05.)

NICKEL IODATE $\text{Ni}(\text{IO}_3)_2$.

SOLUBILITY IN WATER.

(Meusser — Ber. 34, 2440, '01.)

| t°. | Gms. $\text{Ni}(\text{IO}_3)_2$ per 100 Gms. Solution. | Mols. $\text{Ni}(\text{IO}_3)_2$ per 100 Mols. H_2O . | Solid Phase. | t°. | Gms. $\text{Ni}(\text{IO}_3)_2$ per 100 Gms. Solution. | Mols. $\text{Ni}(\text{IO}_3)_2$ per 100 Mols. H_2O . | Solid Phase. |
|-----|---|--|--|-----|---|--|--|
| 0 | 0.73 | 0.033 | $\text{Ni}(\text{IO}_3)_2 \cdot 4\text{H}_2\text{O}$ | 18 | 0.55 | 0.0245 | $\text{Ni}(\text{IO}_3)_2 \cdot 2\text{H}_2\text{O}$ (2) |
| 18 | 1.01 | 0.045 | " | 50 | 0.81 | 0.035 | " |
| 30 | 1.41 | 0.063 | " | 75 | 1.03 | 0.045 | " |
| 0 | 0.53 | 0.023 | $\text{Ni}(\text{IO}_3)_2 \cdot 2\text{H}_2\text{O}$ (1) | 80 | 1.12 | 0.049 | " |
| 18 | 0.68 | 0.030 | " | 30 | 1.135 | 0.050 | $\text{Ni}(\text{IO}_3)_2$ |
| 30 | 0.86 | 0.039 | " | 50 | 1.07 | 0.046 | " |
| 50 | 1.78 | 0.080 | " | 75 | 1.02 | 0.045 | " |
| 8 | 0.52 | 0.023 | $\text{Ni}(\text{IO}_3)_2 \cdot 2\text{H}_2\text{O}$ (2) | 90 | 0.988 | 0.044 | " |

(1) α Dihydrate.(2) β Dihydrate.**NICKEL IODIDE** NiI_2 .

SOLUBILITY IN WATER.

(Etard — Ann. chim. phys. [7] 2, 546, '94.)

| t°. | Gms. NiI_2 per 100 Gms. Solution. | t°. | Gms. NiI_2 per 100 Gms. Solution. | t°. | Gms. NiI_2 per 100 Gms. Solution. |
|-----|---|-----|---|-----|---|
| -20 | 52.0 | 25 | 60.7 | 60 | 64.8 |
| 0 | 55.4 | 30 | 61.7 | 70 | 65.0 |
| 10 | 57.5 | 40 | 63.5 | 80 | 65.2 |
| 20 | 59.7 | 50 | 64.7 | 90 | 65.3 |

NICKEL NITRATE $\text{Ni}(\text{NO}_3)_2$.

SOLUBILITY IN WATER.

(Funk — Wiss. Abh. p. t. Reichanstalt, 3, 439, '00.)

| t°. | Gms. $\text{Ni}(\text{NO}_3)_2$ per 100 Gms. Solution. | Mols. $\text{Ni}(\text{NO}_3)_2$ per 100 Mols. H_2O . | Solid Phase. | t°. | Gms. $\text{Ni}(\text{NO}_3)_2$ per 100 Gms. Solution. | Mols. $\text{Ni}(\text{NO}_3)_2$ per 100 Mols. H_2O . | Solid Phase. |
|-------|---|--|--|------|---|--|--|
| -23 | 39.02 | 6.31 | $\text{Ni}(\text{NO}_3)_2 \cdot 9\text{H}_2\text{O}$ | 20 | 49.06 | 9.49 | $\text{Ni}(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}$ |
| -21 | 39.48 | 6.43 | " | 41 | 55.22 | 12.1 | " |
| -10.5 | 44.13 | 7.79 | " | 56.7 | 62.76 | 16.7 | " |
| -21 | 39.94 | 6.55 | $\text{Ni}(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}$ | 58 | 61.61 | 15.9 | $\text{Ni}(\text{NO}_3)_2 \cdot 3\text{H}_2\text{O}$ |
| -12.5 | 41.59 | 7.01 | " | 60 | 61.99 | 16.0 | " |
| -10 | 42.11 | 7.16 | " | 64 | 62.76 | 16.6 | " |
| -6 | 43.00 | 7.44 | " | 70 | 63.95 | 17.6 | " |
| 0 | 44.32 | 7.86 | " | 90 | 70.16 | 23.1 | " |
| +18 | 48.59 | 9.3 | " | 95 | 77.12 | 33.3 | " |

100 grams sat. solution in glycol contain 7.5 grams $\text{Ni}(\text{NO}_3)_2$ at room temperature. (de Coninck.)

NICKEL SULPHATE NiSO_4 .

SOLUBILITY IN WATER.

(Steele and Johnson — J. Ch. Soc. 85, 116, '04; see also Etard and Mulder.)

| t°. | Grams NiSO_4 per 100 Gms. | | Solid Phase. | t°. | Grams NiSO_4 per 100 Gms. | | Solid Phase. |
|------|---------------------------------------|--------|---|------|---------------------------------------|--------|---|
| | Solution. | Water. | | | Solution. | Water. | |
| 5 | 20.47 | 25.74 | $\text{NiSO}_4 \cdot 7\text{H}_2\text{O}$ | 33.0 | 30.25 | 43.35 | $\text{NiSO}_4 \cdot 6\text{H}_2\text{O}$ |
| 0 | 21.40 | 27.22 | " | 35.6 | 30.45 | 43.79 | " (blue) |
| 9 | 23.99 | 31.55 | " | 44.7 | 32.45 | 48.05 | " |
| 22.6 | 27.48 | 37.90 | " | 50.0 | 33.39 | 50.15 | " |
| 30 | 29.99 | 42.46 | " | 53.0 | 34.38 | 52.34 | " |
| 32.3 | 30.57 | 44.02 | " | 54.5 | 34.43 | 52.50 | $\text{NiSO}_4 \cdot 6\text{H}_2\text{O}$ |
| 33 | 31.38 | 45.74 | " | 57.0 | 34.81 | 53.40 | " (green) |
| 34 | 31.20 | 45.5 | " | 60 | 35.43 | 54.80 | " |
| 32.3 | 30.35 | 43.57 | $\text{NiSO}_4 \cdot 6\text{H}_2\text{O}$ | 70 | 37.29 | 59.44 | " |
| 33.0 | 30.25 | 43.35 | " (blue) | 80 | 38.71 | 63.17 | " |
| 34.0 | 30.49 | 43.83 | " | 99 | 43.42 | 76.71 | " |

Transition points, hepta hydrate \rightleftharpoons hexa hydrate = 31.5°.

Hexa hydrate (blue) \rightleftharpoons hexa hydrate (green) = 53.3°.

SOLUBILITY OF MIXTURES OF NICKEL SULPHATE AND COPPER SULPHATE.

(Fock — Z. Kryst. Min. 28, 387, '97.)

Results at 35°.

| Gms. per 100 Gms. H ₂ O. | | Mol. per cent in Solution. | | Mol. per cent in Solid Phase. | | Crystal Form. |
|-------------------------------------|---------------------|----------------------------|---------------------|-------------------------------|---------------------|---------------|
| CuSO ₄ . | NiSO ₄ . | CuSO ₄ . | NiSO ₄ . | CuSO ₄ . | NiSO ₄ . | |
| 9.62 | 583.9 | 1.57 | 98.43 | 0.35 | 99.65 | Rhombic |
| 41.66 | 484.4 | 7.69 | 92.31 | 2.12 | 97.88 | " |
| 75.39 | 553.5 | 11.66 | 88.34 | 4.77 | 95.23 | Tetragonal |
| 106.40 | 506.5 | 16.92 | 83.08 | 6.52 | 93.48 | " |
| 172.0 | 483.8 | 25.63 | 74.37 | 13.88 | 86.17 | " |
| 186.9 | 468.0 | 27.90 | 72.10 | 18.77 | 81.23 | Tetragonal |
| | | | | 94.91 | 5.09 | Triclinic |

Results at 67°.

| | | | | | | |
|-------|-------|-------|-------|-------|-------|---------------------------|
| 20.04 | 729.3 | 2.65 | 97.35 | 0.93 | 99.07 | Monoclinic |
| 66.01 | 706.2 | 8.31 | 91.69 | 2.86 | 97.14 | " |
| 88.08 | 501.6 | 13.55 | 86.45 | 3.92 | 96.08 | " |
| 47.94 | 675.0 | 16.39 | 83.61 | 6.66 | 93.34 | " |
| 249.9 | 747.8 | 24.46 | 75.54 | 22.32 | 77.68 | { Monoclinic Triclinic |

SOLUBILITY OF MIXTURES OF NICKEL SULPHATE AND SODIUM SULPHATE, ETC.

(Koppel; Wetzel — Z. physik. Chem. 52, 401, '05.)

| t°. | Gms. per 100 Gms. Solution. | | Gms. per 100 Gms. H ₂ O. | | Mols. per 100 Mols. H ₂ O. | | Solid Phase. |
|------|-----------------------------|-----------------------------------|-------------------------------------|-----------------------------------|---------------------------------------|-----------------------------------|---|
| | NiSO ₄ . | Na ₂ SO ₄ . | NiSO ₄ . | Na ₂ SO ₄ . | NiSO ₄ . | Na ₂ SO ₄ . | |
| 0 | 16.94 | 7.61 | 22.46 | 10.09 | 2.61 | 1.28 | NiSO ₄ ·7H ₂ O + Na ₂ SO ₄ ·10H ₂ O |
| 5 | 17.99 | 10.85 | 25.28 | 15.24 | 2.94 | 1.93 | |
| 10 | 18.97 | 13.85 | 28.26 | 20.64 | 3.29 | 2.61 | |
| 20 | 18.76 | 17.21 | 29.31 | 26.87 | 3.410 | 3.404 | NiNa ₂ (SO ₄) ₂ ·4H ₂ O |
| 25 | 17.85 | 16.54 | 27.33 | 25.33 | 3.181 | 3.208 | " |
| 30 | 16.74 | 15.34 | 24.64 | 22.58 | 2.868 | 2.861 | " |
| 35 | 16.28 | 14.91 | 23.66 | 21.67 | 2.753 | 2.744 | " |
| 40 | 15.35 | 14.49 | 21.88 | 20.65 | 2.546 | 2.616 | " |
| 18.5 | 19.61 | 16.49 | 30.70 | 25.80 | 3.56 | 3.27 | NiNa ₂ (SO ₄) ₂ ·4H ₂ O + NiSO ₄ ·7H ₂ O |
| 20 | 20.13 | 16.15 | 31.59 | 25.35 | 3.67 | 3.21 | |
| 25 | 21.20 | 14.77 | 33.11 | 23.06 | 3.85 | 2.92 | |
| 30 | 22.60 | 12.80 | 34.98 | 19.82 | 4.07 | 2.59 | |
| 35 | 23.62 | 10.78 | 36.01 | 16.43 | 4.19 | 2.08 | |
| 40 | 24.92 | 9.39 | 37.93 | 14.29 | 4.41 | 1.81 | NiNa ₂ (SO ₄) ₂ ·4H ₂ O + Na ₂ SO ₄ ·10H ₂ O |
| 18.5 | 16.80 | 18.93 | 26.14 | 29.45 | 3.04 | 3.72 | |
| 20 | 15.48 | 20.18 | 24.06 | 31.37 | 2.80 | 3.97 | |
| 25 | 10.92 | 24.12 | 16.81 | 37.13 | 1.96 | 4.70 | NiNa ₂ (SO ₄) ₂ ·4H ₂ O + Na ₂ SO ₄ |
| 30 | 6.40 | 28.71 | 9.87 | 44.25 | 1.15 | 5.60 | |
| 35 | 4.54 | 31.65 | 7.13 | 49.59 | 0.838 | 6.28 | |
| 40 | 4.63 | 31.37 | 7.24 | 49.03 | 0.843 | 6.21 | |

SOLUBILITY OF NICKEL POTASSIUM SULPHATE $\text{NiK}_2(\text{SO}_4)_2 \cdot 6\text{H}_2\text{O}$ IN WATER.

(Tobler — Liebig's Ann. 95, 193, '55; v. Hauer — J. pr. Ch. 74, 433, '58.)

| t°. | Grams $\text{NiK}_2(\text{SO}_4)_2$ per 100 Gms. H_2O . | | t°. | Grams $\text{NiK}_2(\text{SO}_4)_2$ per 100 Gms. H_2O . | |
|-----|--|-------------|-----|--|-------------|
| | (Tobler.) | (v. Hauer.) | | (Tobler.) | (v. Hauer.) |
| 0 | 5.3 | ... | 50 | 30 | ... |
| 10 | 8.9 | ... | 60 | 35.4 | 20.47 |
| 20 | 13.8 | 9.53 | 70 | 42.0 | ... |
| 30 | 18.6 | ... | 80 | 46.0 | 28.2 |
| 40 | 24.0 | 14.03 | | | |

SOLUBILITY OF NICKEL SULPHATE IN METHYL AND ETHYL ALCOHOLS.

(de Bruyn — Z. physik. Ch. 10, 783, '92.)

100 grams abs. ethyl alcohol dissolve 1.3 grams $\text{NiSO}_4 \cdot 7\text{H}_2\text{O}$ at 17°.
 100 grams abs. methyl alcohol dissolve 46.0 grams $\text{NiSO}_4 \cdot 7\text{H}_2\text{O}$ at 17°, and 24.7 grams at 4°.
 100 grams abs. methyl alcohol dissolve 0.5 gram NiSO_4 at 18°.
 100 grams abs. methyl alcohol dissolve 31.6 grams $\text{NiSO}_4 \cdot 6\text{H}_2\text{O}$ at 17°.
 100 grams 93.5% methyl alcohol dissolve 10.1 grams $\text{NiSO}_4 \cdot 7\text{H}_2\text{O}$ at 4°, and 7.8 grams $\text{NiSO}_4 \cdot 6\text{H}_2\text{O}$ at 18°.
 100 grams 50.0% methyl alcohol dissolve 2.0 grams $\text{NiSO}_4 \cdot 7\text{H}_2\text{O}$ at 4°, and 1.9 grams $\text{NiSO}_4 \cdot 6\text{H}_2\text{O}$ at 18°.

100 grams sat. solution in glycol contain 9.7 grams NiSO_4 at room temperature.

(de Coninck — Bull. acad. roy. Belgique 359, '05.)

NICOTINE $\text{C}_{10}\text{H}_{14}\text{N}_2$.

SOLUBILITY IN WATER.

(Hudson — Z. physik. Chem. 47, 114, '04.)

Determinations made by Synthetic Method, for which see Note, page 9. Below 60° and above 210° both liquids are miscible in all proportions; likewise with percentages of nicotine less than 6.8 and above 82 per cent the liquid does not show two layers at any temperature. Below 94° the upper layer is water. Above 94° the upper layer is nicotine. The curve plotted from the following results makes a complete circle.

| Percentage of Nicotine in the Mixture. | Temp. of Appearance of Two Layers. Degrees C. | Temperature of Homogeneity. Degrees C. |
|--|--|---|
| 6.8 | 94 | 95 |
| 7.8 | 89 | 155 |
| 10.0 | 75 | ... |
| 14.8 | 65 | 200 |
| 32.2 | 61 | 210 |
| 49.0 | 64 | 205 |
| 66.8 | 72 | 190 |
| 80.2 | 87 | 170 |
| 82.0 | 129 | 130 |

NITROGEN N.

SOLUBILITY IN WATER.

(Winkler — Ber. 24, 3606, '91; Braun — Z. physik. Chem. 33, 732, '00; Bohr and Bock — Wied. Ann. 44, 318, '91.)

| t°. | "Coefficient of Absorption" β . | | | "Solubility" β' . | g. |
|-----|---------------------------------------|---------|--------|-------------------------|----------|
| 0 | 0.0235* | 0.0239† | ... ‡ | 0.0233* | 0.00239* |
| 5 | 0.0208 | 0.0215 | 0.0217 | 0.0206 | 0.00259 |
| 10 | 0.0186 | 0.0196 | 0.0200 | 0.0183 | 0.00230 |
| 15 | 0.0168 | 0.0179 | 0.0179 | 0.0165 | 0.00208 |
| 20 | 0.0154 | 0.0164 | 0.0162 | 0.0151 | 0.00189 |
| 25 | 0.0143 | 0.0150 | 0.0143 | 0.0139 | 0.00174 |
| 30 | 0.0134 | 0.0138 | ... | 0.0128 | 0.00161 |
| 35 | 0.0125 | 0.0127 | ... | 0.0118 | 0.00148 |
| 40 | 0.0118 | 0.0118 | ... | 0.0110 | 0.00139 |
| 50 | 0.0109 | 0.0106 | ... | 0.0096 | 0.00121 |
| 60 | 0.0102 | 0.0100 | ... | 0.0082 | 0.00105 |
| 80 | 0.0096 | ... | ... | 0.0051 | 0.00069 |
| 100 | 0.0095 | 0.0100 | ... | 0.0000 | 0.00000 |

* W.

† B. and B.

‡ B.

For values of β , β' , and q , see Ethane, page 133.

SOLUBILITY OF NITROGEN IN AQUEOUS SALT SOLUTIONS.

(Braun.)

| t°. | Coefficient of Absorption of N in Barium Chloride Solutions of: | | | | |
|-----|---|--------------------|-------------------|-------------------|-------------------|
| | 13.83 per cent. | 11.02 per cent. | 6.00 per cent. | 3.87 per cent. | 3.33 per cent. |
| 5 | 0.0127 | 0.0137 | 0.0160 | 0.0180 | 0.0183 |
| 10 | 0.0117 | 0.0125 | 0.0147 | 0.0166 | 0.0168 |
| 15 | 0.0104 | 0.0114 | 0.0132 | 0.0148 | 0.0150 |
| 20 | 0.0092 | 0.0098 | 0.0118 | 0.0132 | 0.0135 |
| 25 | 0.0078 | 0.0086 | 0.0104 | 0.0114 | 0.0119 |

| t°. | Coefficient of Absorption of N in Sodium Chloride Solutions of: | | | | |
|-----|---|-------------------|------------------|-------------------|-------------------|
| | 11.73 per cent. | 8.14 per cent. | 6.4 per cent. | 2.12 per cent. | 0.67 per cent. |
| 5 | 0.0102 | 0.0127 | 0.0138 | 0.0179 | 0.0200 |
| 10 | 0.0093 | 0.0113 | 0.0126 | 0.0164 | 0.0185 |
| 15 | 0.0081 | 0.0101 | 0.0113 | 0.0147 | 0.0164 |
| 20 | 0.0066 | 0.0087 | 0.0098 | 0.0131 | 0.0148 |
| 25 | 0.0047 | 0.0075 | 0.0083 | 0.0113 | 0.0130 |

SOLUBILITY OF NITROGEN IN ALCOHOL.

(Bunsen.)

| t° | 0° | 5° | 10° | 15° | 20° | 24° |
|---|--------|--------|--------|--------|--------|--------|
| Vols. N * dissolved by 1 Vol. Alcohol. | 0.1263 | 0.1244 | 0.1228 | 0.1214 | 0.1204 | 0.1198 |

* At 0° and 760 mm.

NITROGEN

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SOLUBILITY OF NITROGEN IN MIXTURES OF ALCOHOL AND WATER AT 25°.

(Just — Z. physik. Ch. 37, 361, '01.)

Results in terms of the Ostwald solubility expression, see page 105.

| Vol. H ₂ O in Mixture. | Vol. Alcohol in Mixture. | Dissolved N (<i>l</i> ₂₅). |
|-----------------------------------|--------------------------|---|
| 100 | 0 | 0.01634 |
| 80 | 20 | 0.01536 |
| 67 | 33 | 0.01719 |
| 0 | 100 (99.8% Alcohol) | 0.1432 |

SOLUBILITY OF NITROGEN IN SEVERAL SOLVENTS AT 20° AND 25°.

(Just.)

| Solvent. | <i>l</i> ₂₅ . | <i>l</i> ₂₀ . | Solvent. | <i>l</i> ₂₅ . | <i>l</i> ₂₀ . |
|-----------------|--------------------------|--------------------------|-----------------------|--------------------------|--------------------------|
| Water | 0.01634 | 0.01705 | Toluene | 0.1235 | 0.1186 |
| Aniline | 0.03074 | 0.02992 | Chloroform | 0.1348 | 0.1282 |
| Sulphur Dioxide | 0.05860 | 0.05290 | Methyl Alcohol | 0.1415 | 0.1348 |
| Nitro Benzene | 0.06255 | 0.06082 | Ethyl Alcohol (99.8%) | 0.1432 | 0.1400 |
| Benzene | 0.1159 | 0.1114 | Acetone | 0.1460 | 0.1383 |
| Acetic Acid | 0.1190 | 0.1172 | Amyl Acetate | 0.1542 | 0.1512 |
| Xylene | 0.1217 | 0.1185 | Ethyl Acetate | 0.1727 | 0.1678 |
| Amyl Alcohol | 0.1225 | 0.1208 | Iso Butyl Acetate | 0.1734 | 0.1701 |

SOLUBILITY OF NITROGEN IN PETROLEUM. COEFFICIENT OF ABSORPTION AT 10° = 0.135, AT 20° = 0.117.

(Gniewasz and Walfisz — Z. physik. Ch. 1, 70, '87.)

SOLUBILITY OF NITROGEN IN AQUEOUS PROPIONIC ACID AND UREA SOLUTIONS.

(Braun.)

| t°. | Coefficient of Absorption of N in C ₂ H ₅ COOH Solutions of: | | | | |
|-----|--|----------------|----------------|----------------|----------------|
| | 11.22 per cent. | 9.54 per cent. | 6.07 per cent. | 4.08 per cent. | 3.82 per cent. |
| 5 | 0.0195 | 0.0204 | 0.0208 | 0.0210 | 0.0209 |
| 10 | 0.0178 | 0.0182 | 0.0186 | 0.0192 | 0.0191 |
| 15 | 0.0159 | 0.0163 | 0.0164 | 0.0169 | 0.0167 |
| 20 | 0.0146 | 0.0147 | 0.0148 | 0.0154 | 0.0155 |
| 25 | 0.0130 | 0.0134 | 0.0134 | 0.0137 | 0.0137 |

| t°. | Coefficient of Absorption of N in CO(NH ₂) ₂ Solutions of: | | | | | |
|-----|---|----------------|----------------|----------------|----------------|----------------|
| | 15.65 per cent. | 11.9 per cent. | 9.42 per cent. | 6.90 per cent. | 5.15 per cent. | 2.28 per cent. |
| 5 | 0.0175 | 0.0179 | 0.0190 | 0.0198 | 0.0197 | 0.0199 |
| 10 | 0.0162 | 0.0167 | 0.0176 | 0.0183 | 0.0182 | 0.0184 |
| 15 | 0.0150 | 0.0149 | 0.0158 | 0.0165 | 0.0165 | 0.0171 |
| 20 | 0.0140 | 0.0139 | 0.0146 | 0.0151 | 0.0151 | 0.0155 |
| 25 | 0.0130 | 0.0130 | 0.0133 | 0.0137 | 0.0135 | 0.0139 |

NITROUS OXIDE N_2O .

SOLUBILITY IN WATER.

(Bunsen; Gordon — *Z. physik. Ch.* 18, 9, '95; Roth — *Ibid.* 24, 123, '97; Knopp — *Ibid.* 48, 106, '04
Geffcken — *Ibid.* 49, 276, '04.)

| t°. | Coefficient of Absorption β . | | | | q | Solubility in terms of Ostwald Expression (l).* | | |
|-----|-------------------------------------|--------|--------|--------|-------|--|--------|--------|
| | (B.) | (G.) | (R.) | (K.) | | (R.) | (K.) | (G.) |
| 5 | 1.0950 | 1.0955 | 1.1403 | ... | 0.205 | 1.161 | ... | 1.067 |
| 10 | 0.9196 | 0.9200 | 0.9479 | ... | 0.171 | 0.9815 | ... | 0.9101 |
| 15 | 0.7778 | 0.7787 | 0.7896 | ... | 0.143 | 0.8315 | ... | 0.7784 |
| 20 | 0.6700 | 0.6700 | 0.6654 | 0.6270 | 0.121 | 0.7131 | 0.6739 | 0.6756 |
| 25 | 0.5961 | ... | 0.5752 | ... | 0.104 | 0.6281 | ... | 0.5992 |

* Calculated by Geffcken.

NOTE. — Knopp and also Geffcken call attention to the fact that Roth in making his determinations used a rubber tube between the gas burette and the shaking flask, and give this as an explanation of the high results which he obtained.

SOLUBILITY OF NITROUS OXIDE IN AQUEOUS SULPHURIC ACID.

(Lunge — *Ber.* 14, 2188, '81; see also Geffcken's results.)

| Sp. Gr. of H_2SO_4 | 1.84 | 1.80 | 1.705 | 1.45 | 1.25 |
|--|------|------|-------|------|------|
| Vols. N_2O dissolved by 100 vols. H_2SO_4 | 75.7 | 66.0 | 39.1 | 41.6 | 33.0 |

100 vols. of KOH solution of 1.12 Sp. Gr. absorb 18.7 vols. N_2O .

100 vols. of NaOH solution of 1.10 Sp. Gr. absorb 23.1 vols. N_2O .

SOLUBILITY OF NITROUS OXIDE IN AQUEOUS SOLUTIONS OF ACIDS.

(Geffcken.)

Results in terms of the Ostwald Solubility Expression (l). See p. 105.

In Hydrochloric Acid. In Nitric Acid. In Sulphuric Acid.

| Gms. HCl per Liter. | N_2O Dissolved | | Gms. HNO_3 per Liter. | N_2O Dissolved | | Gms. H_2SO_4 per Liter. | N_2O Dissolved | |
|------------------------|--------------------------------|------------|-----------------------------------|--------------------------------|------------|--|--------------------------------|------------|
| | l_{15} . | l_{25} . | | l_{15} . | l_{25} . | | l_{15} . | l_{25} . |
| 18.22 | 0.755 | 0.577 | 36.52 | 0.777 | 0.597 | 24.52 | 0.734 | 0.566 |
| 36.45 | 0.738 | 0.568 | 63.05 | 0.777 | 0.602 | 49.04 | 0.699 | 0.543 |
| 72.90 | 0.716 | 0.557 | 126.10 | 0.775 | 0.611 | 98.08 | 0.645 | 0.509 |
| | | | | | | 147.12 | 0.602 | 0.482 |
| | | | | | | 196.16 | 0.562 | 0.463 |

SOLUBILITY OF NITROUS OXIDE IN AQUEOUS SOLUTIONS OF:

(Roth.)

Phosphoric Acid.

Coefficient of Abs. in H_3PO_4 Solutions of:

| t° | 3.38%. | 4.72%. | 8.84%. | 9.89%. | 13.35%. |
|----|--------|--------|--------|--------|---------|
| 5 | 1.057 | 1.0365 | 0.9883 | 0.9635 | 0.9171 |
| 10 | 0.8827 | 0.8665 | 0.8296 | 0.8101 | 0.7711 |
| 15 | 0.7388 | 0.7258 | 0.6977 | 0.6826 | 0.6505 |
| 20 | 0.6253 | 0.6147 | 0.5926 | 0.5810 | 0.5555 |
| 25 | 0.5427 | 0.5329 | 0.5143 | 0.5054 | 0.4860 |

Oxalic Acid.

Coefficient of Abs. in
 $(\text{COOH})_2$ Solutions of:

| t° | 0.812%. | 3.70%. |
|----|---------|--------|
| 5 | 1.1450 | 1.1094 |
| 10 | 0.9526 | 0.9264 |
| 15 | 0.7940 | 0.7745 |
| 20 | 0.6694 | 0.6538 |
| 25 | 0.5784 | 0.5643 |

SOLUBILITY OF NITROUS OXIDE IN AQUEOUS SOLUTIONS OF PROPIONIC ACID AT 20°.

(Knopp.)

| | | | | | |
|------------------------------------|--------|--------|--------|--------|--------|
| Gms. C_2H_5COOH per liter | 15.15 | 60.42 | 158.4 | 176.6 | 344.0 |
| Coef. of Absorp- tion of N_2O | 0.6323 | 0.6369 | 0.6504 | 0.6534 | 0.7219 |

SOLUBILITY OF NITROUS OXIDE IN AQUEOUS SALT SOLUTIONS.

Results by Geffcken in terms of the Ostwald expression (l). See page 105.

| Salt. | Formula. | Conc. of Salt per Liter. | | Solubility of N_2O . | |
|---------------------|----------|--------------------------|--------|------------------------|------------|
| | | Gram Equiv. | Grams. | l_{25} . | l_{35} . |
| Ammonium Chloride | NH_4Cl | 0.5 | 26.76 | 0.730 | 0.557 |
| Ammonium Chloride | NH_4Cl | 1.0 | 53.52 | 0.691 | 0.529 |
| Caesium Chloride | $CsCl$ | 0.5 | 84.17 | 0.710 | 0.544 |
| Lithium Chloride | $LiCl$ | 0.5 | 21.24 | 0.697 | 0.535 |
| Lithium Chloride | $LiCl$ | 1.0 | 42.48 | 0.623 | 0.483 |
| Potassium Bromide | KBr | 0.5 | 59.55 | 0.697 | 0.536 |
| Potassium Bromide | KBr | 1.0 | 119.11 | 0.627 | 0.485 |
| Potassium Chloride | KCl | 0.5 | 37.3 | 0.686 | 0.527 |
| Potassium Chloride | KCl | 1.0 | 74.6 | 0.616 | 0.475 |
| Potassium Iodide | KI | 0.5 | 83.06 | 0.702 | 0.541 |
| Potassium Iodide | KI | 1.0 | 166.12 | 0.633 | 0.492 |
| Potassium Hydroxide | KOH | 0.5 | 28.08 | 0.668 | 0.514 |
| Potassium Hydroxide | KOH | 1.0 | 56.16 | 0.559 | 0.436 |
| Rubidium Chloride | $RbCl$ | 0.5 | 60.47 | 0.695 | 0.533 |
| Rubidium Chloride | $RbCl$ | 1.0 | 120.95 | 0.625 | 0.483 |

Results by Knopp, in terms of the coefficient of absorption. See page 105.

| Salt. | Formula. | Conc. of Salt per Liter. | | Coef. of Absorption of N_2O at 20°. |
|-------------------|----------|--------------------------|--------|--|
| | | Normality. | Grams. | |
| Potassium Nitrate | KNO_3 | 0.1061 | 10.74 | 0.6173 |
| " | " | 0.2764 | 27.94 | 0.6002 |
| " | " | 0.5630 | 56.97 | 0.5713 |
| " | " | 1.1683 | 118.2 | 0.5196 |
| Sodium Nitrate | $NaNO_3$ | 0.1336 | 11.37 | 0.6089 |
| " | " | 0.3052 | 25.97 | 0.5876 |
| " | " | 0.6286 | 53.50 | 0.5465 |
| " | " | 1.1200 | 95.30 | 0.4926 |

Results by Roth, in terms of the coefficient of absorption.

| Grams $NaCl$ per 100 Grams Solution. | Coefficient of Absorption of N_2O at: | | | | |
|--|---|--------|--------|--------|--------|
| | 5°. | 10°. | 15°. | 20°. | 25°. |
| 0.99 | 1.0609 | 0.8812 | 0.7339 | 0.6191 | 0.5363 |
| 1.808 | 1.0032 | 0.8383 | 0.7026 | 0.5962 | 0.5190 |
| 3.886 | 0.9131 | 0.7699 | 0.6495 | 0.5520 | 0.4475 |
| 5.865 | 0.8428 | 0.7090 | 0.5976 | 0.5088 | 0.4224 |

SOLUBILITY OF NITROUS OXIDE IN AQUEOUS SALT SOLUTIONS.

Results by Gordon in terms of coefficient of absorption. See p. 105.

| Salt. | Concentration of Salt. | | Coefficient of Absorption of N ₂ O at: | | | |
|--------------------|-------------------------------|-----------------------|---|-------|-------|-------|
| | Grams per 100 Grams Solution. | Gram Mols. per Liter. | 5°. | 10°. | 15°. | 20°. |
| Calcium Chloride | 5.79 | 0.547 | 0.819 | 0.697 | 0.591 | 0.500 |
| " | 9.86 | 0.964 | 0.668 | 0.586 | 0.509 | 0.435 |
| " | 13.99 | 1.416 | 0.510 | 0.441 | 0.380 | 0.328 |
| Lithium Chloride | 1.35 | 0.319 | 0.986 | 0.831 | 0.700 | 0.594 |
| " | 3.85 | 0.928 | 0.878 | 0.743 | 0.629 | 0.536 |
| " | 11.48 | 2.883 | 0.606 | 0.512 | 0.437 | 0.382 |
| Lithium Sulphate | 2.37 | 0.219 | 0.934 | 0.792 | 0.670 | 0.569 |
| " | 5.46 | 0.521 | 0.795 | 0.665 | 0.557 | 0.474 |
| " | 8.56 | 0.836 | 0.646 | 0.555 | 0.477 | 0.415 |
| Magnesium Sulphate | 5.90 | 0.521 | 0.766 | 0.664 | 0.561 | 0.471 |
| " | 7.66 | 0.687 | 0.708 | 0.586 | 0.488 | 0.414 |
| " | 10.78 | 0.997 | 0.569 | 0.491 | 0.417 | 0.346 |
| Potassium Chloride | 4.90 | 0.676 | 0.879 | 0.751 | 0.643 | 0.555 |
| " | 7.64 | 1.037 | 0.799 | 0.693 | 0.591 | 0.494 |
| " | 14.58 | 2.147 | 0.654 | 0.574 | 0.500 | 0.430 |
| " | 22.08 | 3.414 | 0.544 | 0.459 | 0.390 | 0.339 |
| Potassium Sulphate | 2.62 | 0.154 | 0.986 | 0.831 | 0.701 | 0.605 |
| " | 4.78 | 0.285 | 0.918 | 0.763 | 0.637 | 0.542 |
| Sodium Chloride | 6.20 | 1.107 | 0.800 | 0.682 | 0.585 | 0.509 |
| " | 8.88 | 1.614 | 0.713 | 0.603 | 0.510 | 0.434 |
| " | 12.78 | 2.391 | 0.634 | 0.532 | 0.449 | 0.386 |
| Sodium Sulphate | 5.76 | 0.427 | 0.808 | 0.677 | 0.584 | 0.495 |
| " | 8.53 | 0.646 | 0.692 | 0.574 | 0.482 | 0.416 |
| " | 12.44 | 0.974 | 0.559 | 0.486 | 0.417 | 0.354 |
| Strontium Chloride | 3.31 | 0.215 | 0.928 | 0.788 | 0.671 | 0.578 |
| " | 5.73 | 0.380 | 0.848 | 0.709 | 0.610 | 0.550 |
| " | 13.24 | 0.939 | 0.644 | 0.547 | 0.463 | 0.390 |

SOLUBILITY OF NITROUS OXIDE IN ALCOHOL AND IN AQUEOUS CHLORAL HYDRATE SOLUTIONS AT 20°.

(Bunsen; Knopp — Z. physik. Ch. 48, 106, '04.)

| t°. | In Alcohol (B.). | | In Aq. Chloral Hydrate (K.). | | |
|-----|--|--|--|------------------------------------|--|
| | Vols. N ₂ O (at 0° and 760 mm.) per 1 Vol. Alcohol. | Normality of C ₂ HCl ₃ O.H ₂ O. | Gms. C ₂ HCl ₃ O.H ₂ O per Liter. | Coef. of Abs. of N ₂ O. | |
| 0 | 4.178 | 0.184 | 30.43 | 0.618 | |
| 5 | 3.844 | 0.445 | 73.60 | 0.613 | |
| 10 | 3.541 | 0.942 | 155.8 | 0.596 | |
| 15 | 3.268 | 1.165 | 192.7 | 0.589 | |
| 20 | 3.025 | 1.474 | 243.8 | 0.579 | |
| 24 | 2.853 | 1.911 | 316.4 | 0.567 | |

SOLUBILITY OF NITROUS OXIDE IN PETROLEUM. COEFFICIENT OF ABSORPTION AT 10° = 2.49, AT 20° = 2.11.

(Gniewasz and Walfisz — Z. physik. Ch. 1, 70, '87.)

SOLUBILITY OF NITROUS OXIDE IN AQUEOUS SOLUTIONS OF GLYCERINE
AND OF UREA.

(Roth.)

| t°. | Coefficient of Absorption of N ₂ O in Glycerine Solutions of: | | | |
|-----|--|----------------|-----------------|-----------------|
| | 3.46 per cent. | 6.73 per cent. | 12.12 per cent. | 16.24 per cent. |
| 5 | 1.097 | 1.055 | 0.999 | 0.959 |
| 10 | 0.917 | 0.887 | 0.841 | 0.810 |
| 15 | 0.767 | 0.745 | 0.710 | 0.686 |
| 20 | 0.647 | 0.630 | 0.605 | 0.585 |
| 25 | 0.556 | 0.542 | 0.527 | 0.508 |

| t°. | Coefficient of Absorption of N ₂ O in Urea Solutions of: | | | | |
|-----|---|----------------|----------------|----------------|----------------|
| | 3.31 per cent. | 4.97 per cent. | 6.37 per cent. | 7.30 per cent. | 9.97 per cent. |
| 5 | 1.104 | 1.096 | 1.088 | 1.101 | 1.069 |
| 10 | 0.921 | 0.920 | 0.909 | 0.921 | 0.901 |
| 15 | 0.771 | 0.773 | 0.761 | 0.772 | 0.761 |
| 20 | 0.653 | 0.656 | 0.644 | 0.655 | 0.651 |
| 25 | 0.569 | 0.567 | 0.559 | 0.570 | 0.569 |

NITRIC OXIDE NO.

SOLUBILITY IN WATER.

(Winkler — Ber. 34, 14'4, '01.)

| t°. | β . | β' . | g. | t°. | β . | β' . | g. |
|-----|-----------|------------|---------|-----|-----------|------------|---------|
| 0 | 0.0738 | 0.0734 | 0.00984 | 40 | 0.0351 | 0.0325 | 0.00440 |
| 5 | 0.0646 | 0.0641 | 0.00860 | 50 | 0.0315 | 0.0277 | 0.00376 |
| 10 | 0.0571 | 0.0564 | 0.00757 | 60 | 0.0295 | 0.0237 | 0.00324 |
| 15 | 0.0515 | 0.0506 | 0.00680 | 70 | 0.0281 | 0.0195 | 0.00267 |
| 20 | 0.0471 | 0.0460 | 0.00618 | 80 | 0.0270 | 0.0144 | 0.00199 |
| 25 | 0.0430 | 0.0419 | 0.00564 | 90 | 0.0265 | 0.0082 | 0.00114 |
| 30 | 0.0400 | 0.0384 | 0.00517 | 100 | 0.0263 | 0.0000 | 0.00000 |

For values of β , β' and g , see Ethane, page 133.SOLUBILITY OF NITRIC OXIDE IN AQUEOUS SULPHURIC ACID
SOLUTIONS AT 18°.

(Lunge — Ber. 18, 1391, '85; Tower — Z. anorg. Ch. 50, 382, '06.)

| Wt. per cent H ₂ SO ₄ in Solution. | Sp. Gr. at 15°. | Tension of H ₂ O Vapor. | Solubility Coefficient * of NO at 18°. |
|---|--------------------|---------------------------------------|---|
| 98 | 1.84 | ... | 0.0227 (0.035, L.) |
| 90 | 1.82 | 0.1 mm. | 0.0193 |
| 80 | 1.733 | 0.4 " | 0.0117 |
| 70 | 1.616 | 1.5 " | 0.0113 |
| 60 | 1.503 | 3.1 " | 0.0118 (0.017, L.) |
| 50 | 1.399 | 6.2 " | 0.0120 |

* Volume of NO (at 760 mm.) per 1 volume of aqueous H₂SO₄.

SOLUBILITY OF NITRIC OXIDE IN ALCOHOL.

(Bunsen.)

| t° | 0° | 5° | 10° | 15° | 20° | 24° |
|--------------------------------------|-------|-------|-------|-------|-------|-------|
| Vols. NO* absorbed by 1 vol. Alc. | 0.316 | 0.300 | 0.286 | 0.275 | 0.266 | 0.261 |

* At 0° and 760 mm.

OXALIC ACID $(\text{COOH})_2 \cdot 2\text{H}_2\text{O}$.

SOLUBILITY IN WATER.

(Average curve from results of Alluard; Miczynski — *Monatsh. Ch.* 7, 258, '86; Henry — *Compt. rend.* 99, 1157, '84; Lamouroux — *Ibid.* 128, 998, '99; at 25°, Foote and Andrew — *Am. Ch. J.* 34, 154, '05.)

| t°. | Grams $(\text{COOH})_2$ per 100 Grams | | t°. | Grams $(\text{COOH})_2$ per 100 Grams | |
|-----|---------------------------------------|-----------|-----|---------------------------------------|-----------|
| | H ₂ O. | Solution. | | H ₂ O. | Solution. |
| 0 | 3.45 | 3.33 | 40 | 21.15 | 17.46 |
| 10 | 5.55 | 5.26 | 50 | 31.53 | 23.97 |
| 20 | 8.78 | 8.07 | 60 | 45.55 | 31.37 |
| 25 | 11.36 | 10.21 | 70 | 63.82 | 38.95 |
| 30 | 13.77 | 11.91 | | | |

SOLUBILITY OF OXALIC ACID IN ALCOHOLS.

(Timofeiew — *Compt. rend.* 112, 1137, '91; Bourgoin — *Ann. chim. phys.* [5] 13, 406, '78).

| t°. | Grams $(\text{COOH})_2$ per 100 Grams of: | | |
|------|---|----------------|-----------------|
| | Methyl Alcohol. | Ethyl Alcohol. | Propyl Alcohol. |
| — 1 | 36.26 | 20.25 | 9.73 |
| + 20 | 47.24 | 26.23 | 15.14 |

SOLUBILITY OF OXALIC ACID IN ABSOLUTE AND IN Aq. ETHER AT 25°.

(Bödtker — *Z. physik. Ch.* 22, 512, '97; Bourgoin.)

100 grams absolute ether dissolve 1.47 grams $(\text{COOH})_2 \cdot 2\text{H}_2\text{O}$.

100 grams absolute ether dissolve 23.59 grams $(\text{COOH})_2$.

In Aqueous Ether Solutions.

| Gms. Solid Acid Added per 100 cc. Ether Solution. | | Grams per 100 cc. Ether Solution. | |
|---|---------------------|-----------------------------------|---------------------|
| $(\text{COOH})_2 \cdot 2\text{H}_2\text{O}$. | $(\text{COOH})_2$. | H ₂ O. | $(\text{COOH})_2$. |
| (1) 5.0 | 0.0 | 1.250 | 0.742 |
| (2) 5.0 | 0.0 | 0.788 | 0.720 |
| 5.0 | 0.0 | 0.418 | 1.044 |
| 5.0 | 2.44 | 0.360 | 3.388 |
| 5.0 | 4.82 | 0.484 | 6.038 |
| 5.0 | 7.14 | 0.558 | 8.538 |
| 5.0 | 9.42 | 0.632 | 10.996 |
| 5.0 | 11.63 | 0.676 | 13.316 |
| 5.0 | 13.79 | 0.761 | 15.684 |
| 5.0 | 18.18 | 0.816 | 17.818 |
| 5.0 | 22.73 | 0.816 | 17.818 |

(1) Ether saturated with water. (2) Ether containing 0.694 per cent water.

100 grams glycerine dissolve 15 grams oxalic acid at 15.5°.

DISTRIBUTION OF OXALIC ACID BETWEEN WATER AND AMYL ALCOHOL AT 20°.

(Herz and Fischer — *Ber.* 37, 4748, '04.)

| Millimols $\frac{1}{2}(\text{COOH})_2$ per 10 cc. | | Grams $(\text{COOH})_2$ per 100 cc. | |
|---|------------------|-------------------------------------|------------------|
| Aq. Layer. | Alcoholic Layer. | Aq. Layer. | Alcoholic Layer. |
| 0.6806 | 0.1451 | 0.306 | 0.0653 |
| 2.364 | 0.7233 | 1.064 | 0.326 |
| 6.699 | 2.550 | 3.015 | 1.148 |
| 10.029 | 4.300 | 4.511 | 1.934 |

OXYGEN O. SOLUBILITY IN WATER.

(Winkler — Ber. 24, 3609, '91; Bohr and Bock — Wied. Ann. [2] 44, 318, '91.)

| t°. | Coef. of Absorption β . | | g. | cc. O per Liter H ₂ O. | t°. | Coef. of Absorption β . | | g. |
|-----|-------------------------------|---------|---------|-----------------------------------|-----|-------------------------------|---------|---------|
| 0 | 0.0489* | 0.0496† | 0.00695 | 10.187 | 40 | 0.0231* | 0.0233† | 0.00308 |
| 5 | 0.0429 | 0.0439 | 0.00607 | 8.907 | 50 | 0.0209 | 0.0207 | 0.00266 |
| 10 | 0.0380 | 0.0390 | 0.00537 | 7.873 | 60 | 0.0195 | 0.0189 | 0.00227 |
| 15 | 0.0342 | 0.0350 | 0.00480 | 7.038 | 70 | 0.0183 | 0.0178 | 0.00186 |
| 20 | 0.0310 | 0.0317 | 0.00434 | 6.356 | 80 | 0.0176 | 0.0172 | 0.00138 |
| 25 | 0.0283 | 0.0290 | 0.00393 | 5.776 | 90 | 0.0172 | 0.0169 | 0.00079 |
| 30 | 0.0261 | 0.0268 | 0.00359 | 5.255 | 100 | 0.0170 | 0.0168 | 0.00000 |

* W.

† B. and B.

For values of β and q see Ethane, page 133.

SOLUBILITY OF THE OXYGEN OF AIR IN WATER.

| t°. | 5.2° | 5.65° | 14.78° | 24.8° |
|--------------|-------|-------|--------|-------|
| Solubility * | 8.856 | 8.744 | 7.08 | 5.762 |

* cc. Oxygen per 1000 cc. H₂O saturated with air at 760 mm.

SOLUBILITY OF OXYGEN IN WATER AND IN AQUEOUS SOLUTIONS OF ACIDS, BASES AND SALTS.

(Geffcken — Z. physik. Ch. 49, 269, '04.)

| Aq. Solution of: | Concentration per Liter. | | Solubility of Oxygen.* | |
|---------------------|--------------------------|--------|------------------------|--------|
| | Gram Equiv. | Grams. | 15°. | 18°. |
| Water alone | ... | ... | 0.0363 | 0.0308 |
| Hydrochloric Acid | 0.5 | 18.22 | 0.0344 | 0.0296 |
| " | 1.0 | 36.45 | 0.0327 | 0.0287 |
| " | 2.0 | 72.90 | 0.0299 | 0.0267 |
| Nitric Acid | 0.5 | 36.52 | 0.0348 | 0.0302 |
| " | 1.0 | 63.05 | 0.0336 | 0.0295 |
| " | 2.0 | 126.10 | 0.0315 | 0.0284 |
| Sulphuric Acid | 0.5 | 24.52 | 0.0338 | 0.0288 |
| " | 1.0 | 49.04 | 0.0319 | 0.0275 |
| " | 2.0 | 98.08 | 0.0335 | 0.0251 |
| " | 3.0 | 147.12 | 0.0256 | 0.0229 |
| " | 4.0 | 196.16 | 0.0233 | 0.0209 |
| " | 5.0 | 245.20 | 0.0231 | 0.0194 |
| Potassium Hydroxide | 0.5 | 28.08 | 0.0291 | 0.0252 |
| " | 1.0 | 56.16 | 0.0234 | 0.0206 |
| Sodium Hydroxide | 0.5 | 20.03 | 0.0288 | 0.0250 |
| " | 1.0 | 40.06 | 0.0231 | 0.0204 |
| " | 2.0 | 80.12 | 0.0152 | 0.0133 |
| Potassium Sulphate | 0.5 | 43.59 | 0.0294 | 0.0253 |
| " | 1.0 | 87.18 | 0.0237 | 0.0207 |
| Sodium Chloride | 0.5 | 29.25 | 0.0308 | 0.0262 |
| " | 1.0 | 58.5 | 0.0260 | 0.0223 |
| " | 2.0 | 119.0 | 0.0182 | 0.0158 |

* In terms of the Ostwald Solubility Expressions. See page 105.

SOLUBILITY OF OXYGEN IN Aq. POTASSIUM CYANIDE SOLUTIONS AT 20°.

(MacLaurin — J. Ch. Soc. 63, 737, '93.)

| Gms. KCN per 100 gms. sol. | 1 | 10 | 20 | 30 | 50 |
|--------------------------------|-------|-------|-------|-------|-------|
| Coefficient of absorption of O | 0.029 | 0.018 | 0.013 | 0.008 | 0.003 |

SOLUBILITY OF OXYGEN IN ETHYL ALCOHOL, METHYL ALCOHOL AND IN ACETONE.

(Timofejew — Z. physik. Ch. 6, 151, '90; Levi — Gazz. chim. ital. 31, II, 513, '01.)

| t°. | In Ethyl Alcohol of 99.7% (T.). | | In Methyl Alcohol (L.) $l =$ | In Acetone (L.) $l =$ |
|-----|---------------------------------|--------------|---------------------------------|--------------------------|
| | β . | β' . | | |
| 0 | 0.2337 | 0.2297 | 0.31864 | 0.2997 |
| 5 | 0.2301 | 0.2247 | 0.30506 | 0.2835 |
| 10 | 0.2266 | 0.2194 | 0.29005 | 0.2667 |
| 15 | 0.2232 | 0.2137 | 0.27361 | 0.2493 |
| 20 | 0.2201 | 0.2073 | 0.25574 | 0.2313 |
| 25 | 0.2177 (24°) | 0.2017 (24°) | 0.23642 | 0.2127 |
| 30 | ... | ... | 0.21569 | 0.1935 |
| 40 | ... | ... | 0.16990 | 0.1533 |
| 50 | ... | ... | 0.11840 | 0.1057 |

For values of β and β' , see Ethane, page 133. l = Ostwald Solubility Expression. See page 105.

The formulae expressing the solubility of oxygen in methyl alcohol and in acetone as shown in the above table are as follows:

$$\begin{aligned} \text{In Methyl Alcohol } l &= 0.31864 - 0.002572 t - 0.00002866 t^2. \\ \text{In Acetone } l &= 0.2997 - 0.00318 t - 0.000012 t^2. \end{aligned}$$

SOLUBILITY OF OXYGEN IN AQUEOUS ALCOHOL AT 20° AND 760 MM.

(Lubarsch — Wied. Ann. [2] 37, 525, '89.)

| Wt. per cent Alcohol. | Vol. per cent Absorbed O. | Wt. per cent Alcohol. | Vol. per cent Absorbed O. | Wt. per cent Alcohol. | Vol. per cent Absorbed O. |
|-----------------------|---------------------------|-----------------------|---------------------------|-----------------------|---------------------------|
| 0.00 | 2.98 | 23.08 | 2.52 | 50.0 | 3.50 |
| 9.09 | 2.78 | 28.57 | 2.49 | 66.67 | 4.95 |
| 16.67 | 2.63 | 33.33 | 2.67 | 80.0 | 5.66 |

SOLUBILITY OF OXYGEN IN PETROLEUM. COEFFICIENT OF ABSORPTION AT 10° = 0.229, AT 20° = 0.202.

(Gniewasz and Walfisz — Z. physik. Ch. 1, 70, '87.)

OZONE O₃.

SOLUBILITY IN WATER.

(von Mailfert — Compt. rend. 119, 951, '94; Carius; Schöne — Ber. 6, 1224, '73.)

| t°. | W. | G. | R. | t°. | W. | G. | R. |
|------|------|------|-------|-----|------|------|-------|
| 0 | 39.4 | 61.5 | 0.641 | 27 | 13.9 | 51.4 | 0.270 |
| 6 | 34.3 | 61.0 | 0.562 | 33 | 7.7 | 39.5 | 0.195 |
| 11.8 | 29.9 | 59.6 | 0.500 | 40 | 4.2 | 37.6 | 0.112 |
| 13.0 | 28.0 | 58.1 | 0.482 | 47 | 2.4 | 31.2 | 0.077 |
| 15.0 | 25.9 | 56.8 | 0.456 | 55 | 0.6 | 19.3 | 0.031 |
| 19.0 | 21.0 | 55.2 | 0.381 | 60 | 0.0 | 12.3 | 0.000 |

W = Milligrams Ozone dissolved per liter water. G = Milligrams Ozone in one liter of the gas phase above the solutions. R = Ratio of the dissolved to undissolved Ozone ($W \div G$).

PARAFFINE

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SOLUBILITY OF OZOKERITE PARAFFINE OF MELTING POINT 64° – 65°
AND SP. GR. AT 20° = 0.917 IN SEVERAL SOLVENTS AT 20° .

(Pawlewski and Filemonowicz — Ber. 21, 2973, '88.)

| Solvent. | Gms. Paraffine per 100 | | Solvent. | Gms. Paraffine per 100 | |
|--|------------------------|--------------|-------------------|------------------------|--------------|
| | Gms. Solvent. | cc. Solvent. | | Gms. Solvent. | cc. Solvent. |
| Carbon Bisulphide | 12.99 | ... | Acetone | 0.262 | 0.209 |
| Benzine, boiling below 75° | 11.73 | 8.48 | Ethyl Acetate | 0.238 | ... |
| Turpentine, b.pt. 158° – 166° | 6.06 | 5.21 | " Alcohol | 0.219 | ... |
| Cumol, com. b.pt. 160° | 4.26 | 3.72 | Amyl Alcohol | 0.202 | 0.164 |
| " frac. 150° – 160° | 3.99 | 3.39 | Propionic Acid | 0.165 | ... |
| Xylene, com.b.pt. 135° – 143° | 3.95 | 3.43 | Propyl Alcohol | 0.141 | ... |
| " frac. 135° – 138° | 4.39 | 3.77 | Methyl Alcohol | 0.071 | 0.056 |
| Toluene, com.b.pt. 108° – 110° | 3.88 | 3.34 | Methyl Formate | 0.060 | ... |
| " frac. 108° – 109° | 3.92 | 3.41 | Acetic Acid | 0.060 | 0.063 |
| Chloroform | 2.42 | 3.61 | " Anhydride | 0.025 | ... |
| Benzene | 1.99 | 1.75 | Formic Acid | 0.013 | 0.015 |
| Ethyl Ether | 1.95 | ... | Ethyl Alcohol 75% | 0.0003 | ... |
| Iso Butyl Alcohol, com. | 0.285 | 0.228 | | | |

PAPAVERINE $C_{20}H_{21}NO_4$.

100 grams pure carbon tetra chloride dissolve 0.203 gram at 17° .

(Schindelmeyer — Chem.-Ztg. 25, 129, '01.)

PHENANTHRENE $C_{14}H_{10}$.

SOLUBILITY IN ALCOHOL AND IN TOLUENE.*

(Speyers — Am. J. Sci. [4] 14, 295, '02.)

In Alcohol.

In Toluene.

| t°. | Gms. $C_{14}H_{10}$ per 100 Grams C_2H_5OH . | Sp. Gr. of Solutions (H_2O at 4° .) | Gms. $C_{14}H_{10}$ per 100 Grams $C_6H_5.CH_3$ | Sp. Gr. of Solutions (H_2O at 4° .) |
|-----|--|---|---|---|
| 0 | 3.65 | 0.814 | 23.0 | 0.925 |
| 10 | 3.80 | 0.807 | 30.0 | 0.929 |
| 20 | 4.6 | 0.801 | 42.0 | 0.934 |
| 25 | 5.5 | 0.799 | 50.0 | 0.939 |
| 30 | 6.4 | 0.797 | 58.0 | 0.943 |
| 40 | 8.2 | 0.795 | 76.0 | 0.955 |
| 50 | 10.6 | 0.794 | 95.0 | 0.971 |
| 60 | 15.6 | 0.797 | 115.0 | 0.989 |
| 70 | 33.0 | 0.815 | 135.0 | 1.007 |
| 80 | ... | 0.865 (76.4°) | 155.0 | 1.027 |

* Calculated from the original results which are given in terms of gram molecules of Phenanthrene per 100 gram molecules of solvent, and for irregular intervals of temperature.

Behrend — Z. physik. Ch. 10, 265, '92, finds 2.77 grams phenanthrene per 100 grams alcohol at 12.3° , and 3.09 grams at 14.8° .

SOLUBILITY OF PHENANTHRENE PICRATE IN ABSOLUTE ALCOHOL.

(Behrend — Z. physik. Ch. 10, 205, '92.)

| t°. | Grams per 100 Grams Saturated Solution. | | |
|------|---|----------------|-------------------------|
| | Picric Acid | + Phenanthrene | = Phenanthrene Picrate. |
| 12.3 | 0.91 | 0.71 | 1.62 |
| 14.3 | 1.00 | 0.78 | 1.78 |
| 17.5 | 1.05 | 0.82 | 1.87 |

SOLUBILITY OF PHENANTHRENE PICRATE IN ALCOHOLIC SOLUTIONS CONTAINING PICRIC ACID AND ALSO PHENANTHRENE.

(Behrend.)

| t°. | Grams Added to 62 cc. Abs. Alcohol. | | | Gms. per 100 Gms. Sat. Solution. | | |
|------|-------------------------------------|--------------|-----------------|----------------------------------|----------------|---------------|
| | P. Picrate | + Picric Ac. | + Phenanthrene. | Picric Ac. | + Phenanthrene | = P. Picrate. |
| 12.3 | 1.4 | 0 | 0.5 | 0.534 | 1.413 | 1.947 |
| 12.3 | 1.4 | 0 | 0.9 | 0.409 | 2.141 | 2.550 |
| 12.3 | 0.8 | 0 | 2.1 | 0.354 | 2.77 | 3.124 |
| 12.3 | 0.8 | 0 | 4.0 | 0.139 | 5.626 | 5.765 |
| 17.5 | 1.4 | 0.1 | 0 | 1.159 | 0.75 | 1.91 |
| 17.5 | 1.4 | 0.2 | 0 | 1.285 | 0.68 | 1.97 |
| 17.5 | 1.4 | 1.0 | 0 | 2.45 | 0.37 | 2.82 |
| 17.5 | 1.4 | 4.0 | 0 | 6.15 | 0.195 | 6.345 |
| 17.5 | 1.4 | 0.0 | 2.2 | 0.423 | 3.276 | 3.699 |

PHENOL C_6H_5OH .

SOLUBILITY IN WATER.

(Alexejew — Wied. Ann. 28, 305, '86; Schreinemaker — Z. physik. Ch. 33, 79, '00; Rothmund — *Ibid* 26, 474, '98.)

Determinations were made by the "Synthetic Method," for which see Note, page 9.

| t°. | Grams Phenol per 100 Grams | |
|--------------------|----------------------------|---------------|
| | Aqueous Layer. | Phenol Layer. |
| 10 | 7.5 | 75.0 |
| 20 | 8.3 | 72.1 |
| 30 | 8.8 | 69.8 |
| 40 | 9.6 | 66.9 |
| 50 | 12.0 | 62.7 |
| 55 | 14.1 | 59.5 |
| 60 | 16.7 | 55.4 |
| 65 | 21.9 | 49.2 |
| 68.3 (crit. temp.) | 33.4 | |

Vaubel — J. pr. Ch. [2] 52, 73, '95, states that 100 grams sat. aqueous solution contain 6.1 grams phenol at 20°. Sp. Gr. of solution = 1.0057.

SOLUBILITY OF PHENIC ACID (PHENOL, C_6H_5OH) IN PARAFFINE AND IN BENZENE.

(Schweissinger — Pharm. Ztg. '84-'85.)

| Solvent. | Grams C_6H_5OH per 100 Grams Solvent at: | | | |
|-----------|--|------|------|-------|
| | 16°. | 21°. | 25°. | 43°. |
| Paraffine | 1.66 | ... | ... | 5.0 |
| Benzene | 2.5 | 8.33 | 10.0 | 100.0 |

SOLUBILITY OF PHENOL IN AQUEOUS ACETONE SOLUTIONS.

(Schreinemaker.)

| | In 4.24 % Acetone. | | In 12.2% Acetone. | | In 24.4% Acetone. | | In 59.9% Acetone. | |
|-----|------------------------------|------------------|-----------------------------|------------------|-----------------------------|------------------|-----------------------------|------------------|
| t°. | Grams Phenol per 100 Gms. | | Gms. Phenol per 100 Gms. | | Gms. Phenol per 100 Gms. | | Gms. Phenol per 100 Gms. | |
| | Aq. Acetone Layer. | Phenol Layer. | Aq. Acetone Layer. | Phenol Layer. | Aq. Acetone Layer. | Phenol Layer. | Aq. Acetone Layer. | Phenol Layer. |
| 20 | ... | ... | ... | ... | ... | ... | 26.0 | 60.5 |
| 30 | 5.0 | 74.0 | 4.0 | 71.0 | 6.0 | 69.5 | 28.5 | 57.0 |
| 40 | 5.5 | 70.0 | ... | ... | ... | ... | 32.0 | 52.0 |
| 50 | 5.7 | 67.0 | 5.0 | 67.0 | 8.0 | 64.0 | 34.5§ | 49.0§ |
| 60 | 6.5 | 61.0 | ... | ... | ... | ... | 36.5 | 46.5 |
| 70 | 9.0 | 51.0 | 7.5 | 57.5 | 19.0 | 57.0 | (49.5°) | 41.5 |
| 80 | 14.0 | 34.0 | 10.5 | 49.5 | 14.0 | 52.5 | | |
| | (84°) 22.5 | | 20.4* | 30.5* | 23.0† | 47.0† | | |
| | | | (90.3°) 25.0 | | 26.5‡ | 44.0‡ | | |
| | | | | | (90.5°) 35.0 | | | |
| | 90° | | 185° | | 187°5 | §45° | 47°5 | |

The figures in the above table were read from curves plotted from the original results.

SOLUBILITY OF PHENOL IN AQUEOUS SOLUTIONS of TARTARIC ACID.

(Schreinemaker.)

| | In 5.093% Acid. | | | In 19.34% Acid. | | | In 40.9% Acid. | |
|------|--------------------------|------------------|-----|--------------------------|------------------|-----|--------------------------|------------------|
| t°. | Gms. Phenol per 100 Gms. | | t°. | Gms. Phenol per 100 Gms. | | t°. | Gms. Phenol per 100 Gms. | |
| | Aq. Acid Layer. | Phenol Layer. | | Aq. Acid Layer. | Phenol Layer. | | Aq. Acid Layer. | Phenol Layer. |
| 30 | 7.5 | 72.5 | 50 | 10.0 | 77.0 | 70 | 13.0 | ... |
| 50 | 10.5 | 65.5 | 60 | 12.5 | 72.0 | 80 | 16.5 | 77.0 |
| 60 | 14.5 | 58.0 | 70 | 19.0 | 64.0 | 85 | 20.0 | 74.0 |
| 65 | 19.5 | 53.0 | 75 | 29.0 | 56.0 | 90 | 26.5 | 71.0 |
| 67.5 | 25.0 | 48.5 | 77 | 47.0 | | 95 | 39.0 | 63.5 |
| 69 | | 47.5 | | | | 97 | | 54.0 |

DISTRIBUTION OF PHENOL BETWEEN:

AMYL ALCOHOL AND WATER AT 25°.

BENZENE AND WATER AT 20°.

(Herz and Fischer — Ber. 37, 4747, '04.)

(Vaubel — J. pr. Ch. [2] 67, 476, '03.)

| Millimols Phenol per 10 cc. | | Gms. Phenol per 100 cc. | |
|--------------------------------|-------------------|----------------------------|-------------------|
| Alcoholic Layer. | Aqueous Layer. | Alcoholic Layer. | Aqueous Layer. |
| 0.75 | 0.047 | 0.705 | 0.0441 |
| 0.9 | 0.05 | 0.846 | 0.047 |
| 1.1 | 0.07 | 1.035 | 0.066 |
| 2.6 | 0.16 | 2.445 | 0.150 |
| 54.1 | 3.83 | 50.88 | 3.601 |
| 56.3 | 3.9 | 52.93 | 3.667 |

| Volumes of Solvents used per 1 Gm. Phenol | | Gms. Phenol in H ₂ O C ₆ H ₆ Layer Layer | |
|---|--------------------------------------|---|--------|
| 50 cc. H ₂ O + | 50 cc. C ₆ H ₆ | 0.286 | 0.714 |
| " | + 100 cc. " | 0.1188 | 0.8212 |
| " | + 150 cc. " | 0.0893 | 0.9107 |
| " | + 200 cc. " | 0.0893 | 0.9107 |

DISTRIBUTION OF PHENOL BETWEEN WATER AND BENZENE AND BETWEEN AQUEOUS K_2SO_4 SOLUTIONS AND BENZENE AT 25° .

(Rothmund and Wilmore — Z. physik. Ch. 40, 623, '02.)

NOTE. — The original results, which are given in terms of gram mols. per liter, were calculated to grams per liter, and plotted on cross-section paper. The following figures were read from the curves obtained.

| Between H_2O and C_6H_6 . | | Effect of K_2SO_4 upon the Distribution. | | | | |
|--------------------------------|-----------------|--|-----------------------------------|-----------------|-----------------------------------|-----------------|
| Grams C_6H_5OH per Liter of: | | Gms. K_2SO_4 per Liter Aq. Solution. | (1) Gms. C_6H_5OH per Liter of: | | (2) Gms. C_6H_5OH per Liter of: | |
| H_2O Layer. | C_6H_6 Layer. | | Aq. Layer. | C_6H_6 Layer. | Aq. Layer. | C_6H_6 Layer. |
| 5 | 10 | 1.36 | 17.08 | 59.96 | 9.52 | 26.28 |
| 10 | 28 | 2.72 | 16.92 | 60.63 | 9.50 | 26.38 |
| 15 | 52 | 5.44 | 16.85 | 60.92 | 9.46 | 26.55 |
| 20 | 84 | 10.89 | 16.44 | 62.73 | 9.35 | 27.06 |
| 25 | 128 | 21.79 | 15.89 | 65.19 | 9.09 | 28.27 |
| 30 | 200 | 43.59 | 14.85 | 69.71 | 8.68 | 30.21 |
| 35 | 300 | 87.18 | 12.92 | 78.00 | 7.79 | 34.38 |
| 40 | 410 | | | | | |
| 45 | 520 | | | | | |
| 50 | 610 | | | | | |

(1) First series.

(2) Second series.

DISTRIBUTION OF PHENOL AT 25° BETWEEN:

(Herz and Fischer — Ber. 38, 1143, '05.)

Water and Toluene.

| Millimols C_6H_5OH per 10 cc. | | Grams C_6H_5OH per 100 cc. | |
|---------------------------------|---------------|------------------------------|---------------|
| $C_6H_5CH_3$ Layer. | H_2O Layer. | $C_6H_5CH_3$ Layer. | H_2O Layer. |
| 1.244 | 0.724 | 1.169 | 0.681 |
| 3.047 | 1.469 | 2.865 | 1.381 |
| 4.667 | 2.200 | 4.389 | 2.068 |
| 6.446 | 2.861 | 6.061 | 2.691 |
| 14.960 | 4.750 | 14.07 | 4.467 |
| 17.725 | 5.346 | 16.69 | 5.027 |
| 47.003 | 7.706 | 44.20 | 7.246 |
| 53.783 | 8.087 | 50.58 | 7.604 |
| 90.287 | 9.651 | 84.89 | 9.074 |

Water and *m* Xylene.

| Millimols C_6H_5OH per 10 cc. | | Grams C_6H_5OH per 100 cc. | |
|---------------------------------|---------------|------------------------------|---------------|
| $mC_6H_4(CH_3)_2$ Layer. | H_2O Layer. | $mC_6H_4(CH_3)_2$ Layer. | H_2O Layer. |
| 1.610 | 1.071 | 1.514 | 1.007 |
| 4.787 | 2.726 | 4.501 | 2.563 |
| 12.210 | 5.168 | 11.22 | 4.860 |
| 22.718 | 6.994 | 21.36 | 6.577 |
| 34.827 | 8.124 | 32.75 | 7.640 |
| 51.352 | 9.123 | 48.28 | 8.578 |
| 77.703 | 10.050 | 73.07 | 9.450 |

DISTRIBUTION OF PHENOL BETWEEN WATER AND CARBON TETRACHLORIDE AT 20° .

(Vaubel — J. pr. Ch. [2] 67, 476, '03.)

| Gms. Phenol Used. | Volumes of Solvents. | | Grams Phenol in: | |
|-------------------|----------------------|-------------------------|------------------|----------------|
| | | | H_2O Layer. | CCl_4 Layer. |
| 1 | 50 cc. | $H_2O + 10$ cc. CCl_4 | 0.8605 | 0.1285 |
| 1 | " | + 20 cc. " | 0.7990 | 0.1900 |
| 1 | " | + 30 cc. " | 0.7275 | 0.2615 |
| 1 | " | + 50 cc. " | 0.6435 | 0.3455 |
| 1 | " | + 100 cc. " | 0.4680 | 0.5210 |
| 1 | " | + 150 cc. " | 0.3645 | 0.6245 |
| 1 | " | + 200 cc. " | 0.3240 | 0.6650 |

PHENOLATE of Phenyl Ammonium.

SOLUBILITY IN WATER.

Figures read from Curve. (Alexejew — Wied. Ann. 28, 305, '86.)

By Synthetic Method, See page 9.

| t°. | Gms. Phenolate per 100 Gms. | | t°. | Gms. Phenolate per 100 Gms. | |
|-----|-----------------------------|------------------|-------------------|-----------------------------|------------------|
| | Aq. Layer. | Phenolate Layer. | | Aq. Layer. | Phenolate Layer. |
| 10 | 3 | 94 | 110 | 9 | 76 |
| 30 | 4 | 93 | 120 | 12 | 69 |
| 50 | 5 | 91 | 130 | 17.5 | 60 |
| 70 | 6 | 87.5 | 140 (crit. temp.) | | 40 |
| 90 | 7 | 83 | | | |

PHENYL (Di) AMINES $C_6H_4(NH_2)_2$.

SOLUBILITY IN WATER AT 20°.

(Vaubel — J. pr. Ch. [2] 52, 73, '95.)

| Amine. | Gms. per 100 Gms. Solution. | Sp. Gr. of Solution. |
|--------------------------|--------------------------------|-------------------------|
| <i>m</i> Phenyl di Amine | 23.8 | 1.0317 |
| <i>p</i> “ | 3.7 | 1.0038 |

Nitro **PHENOLS** $C_6H_4.OH.NO_2$.

100 grams saturated aqueous solution contain: 0.208 gram ortho,
2.14 grams meta, 1.32 grams para nitro phenol at 20°.

(Vaubel.)

Di Nitro **PHENOL** $C_6H_3.OH.(NO_2)_2$.

SOLUBILITY IN ALCOHOLS AT 19.5°.

(de Bruyn — Z. physik. Ch. 10, 784, '92.)

100 grams abs. methyl alcohol dissolve 6.3 grams $C_6H_3.OH.(NO_2)_2$.

100 grams abs. ethyl alcohol dissolve 3.9 grams $C_6H_3.OH.(NO_2)_2$.

SOLUBILITY OF MIXTURES OF *s* TRI BROM PHENOL AND *s* TRI CHLOR PHENOL IN METHYL ALCOHOL AT 25°.

(Thiel — Z. physik. Ch. 43, 667, '03; from Wurfel — Dissertation Marburg, '96.)

| Molecular per cent $C_6H_2.OH.Br_3$ | | <i>s</i> Solubility of | | Total. |
|-------------------------------------|--------------|------------------------|------------------|--------|
| In Solid. | In Solution. | $C_6H_2.OH.Cl_3$ | $C_6H_2.OH.Br_3$ | |
| 0 | 0 | 0.204 | 0 | 0.204 |
| 4.49 | 3.59 | 0.194 | 0.007 | 0.201 |
| 10.13 | 7.58 | 0.191 | 0.016 | 0.206 |
| 16.28 | 12.15 | 0.172 | 0.024 | 0.196 |
| 62.44 | 13.07 | 0.204 | 0.031 | 0.235 |
| 69.88 | 15.86 | 0.150 | 0.028 | 0.178 |
| 81.76 | 19.01 | 0.096 | 0.023 | 0.118 |
| 84.66 | 24.05 | 0.069 | 0.022 | 0.091 |
| 87.53 | 32.46 | 0.043 | 0.021 | 0.063 |
| 93.62 | 47.87 | 0.021 | 0.019 | 0.040 |
| 100.0 | 100.0 | 0.0 | 0.019 | 0.019 |

PHENYL SALICYLATE $C_6H_4(OH).COOC_6H_5$, 1:2.

100 grams H_2O dissolve 0.043 gram salicylate at 25° . 100 grams alcohol dissolve 20.0 grams at 25° .

(U. S. P.)

Di PHENYL $C_6H_5.C_6H_5$.

100 grams absolute methyl alcohol dissolve 6.57 grams at 19.5° .
100 grams abs. ethyl alcohol dissolve 9.98 grams at 19.5° .

(de Bruyn — Z. physik. Ch. 10, 784, '92.)

PHOSPHO MOLYBDIC ACID $P_2O_5.20MoO_3.52H_2O$.

SOLUBILITY IN ETHER.

(Parmentier — Compt. rend. 104, 686, '87.)

| t° | 0° | 8.1° | 19.3° | 27.4° | 32.9° |
|------------------------------|-----------|-------------|--------------|--------------|--------------|
| Gms. Acid per 100 gms. Ether | 80.6 | 84.7 | 96.7 | 103.9 | 107.9 |

PHOSPHORUS P. (yellow)

SOLUBILITY IN BENZENE.

(Christomanos — Z. anorg. Ch. 45, 136, '05.)

| t° | Gms. P per 100 Gms. C_6H_6 . | Sp. Gr. of Solution. | t° | Gms. P per 100 Gms. C_6H_6 . | Sp. Gr. of Solution. | t° | Gms. P per 100 Gms. C_6H_6 . |
|-----------|--------------------------------|----------------------|-----------|--------------------------------|----------------------|-----------|--------------------------------|
| 0 | 1.513 | ... | 23 | 3.399 | 0.8875 | 50 | 6.80 |
| 5 | 1.99 | ... | 25 | 3.70 | 0.8861 | 55 | 7.32 |
| 8 | 2.31 | 0.8990 | 30 | 4.60 | ... | 60 | 7.90 |
| 10 | 2.4 | 0.8985 | 35 | 5.17 | ... | 65 | 8.40 |
| 15 | 2.7 | 0.894 | 40 | 5.75 | ... | 70 | 8.90 |
| 18 | 3.1 | 0.892 | 45 | 6.11 | ... | 75 | 9.40 |
| 20 | 3.2 | 0.890 | | | | 81 | 10.03 |

SOLUBILITY OF PHOSPHORUS IN ETHER.

(Christomanos.)

| t° | Gms. P per 100 Gms. $(C_2H_5)_2O$. | Sp. Gr. of Solutions. | t° | Gms. P per 100 Gms. $(C_2H_5)_2O$. | Sp. Gr. of Solutions. | t° | Gms. P per 100 Gms. $(C_2H_5)_2O$. |
|-----------|-------------------------------------|-----------------------|-----------|-------------------------------------|-----------------------|-----------|-------------------------------------|
| 0 | 0.434 | ... | 15 | 0.90 | 0.723 | 28 | 1.60 |
| 5 | 0.62 | ... | 18 | 1.01 | 0.719 | 30 | 1.75 |
| 8 | 0.79 | 0.732 | 20 | 1.04 | 0.718 | 33 | 1.80 |
| 10 | 0.85 | 0.729 | 23 | 1.12 | 0.722 | 35 | 2.00 |
| | | | 25 | 1.39 | 0.728 | | |

100 grams CS_2 dissolve about 1750 grams yellow P at room temperature.

(Vogel — Jahresber. Chem. 149, '68.)

100 grams alcohol of 0.799 Sp. Gr. dissolve 0.312 gram P cold and 0.416 gram hot.

(Buchner)

SOLUBILITY OF YELLOW PHOSPHORUS IN SEVERAL SOLVENTS AT 15°.

(Stich — Pharm. Ztg. 48, 343, '03.)

| Solvent. | Gms. P per 100 Gms. Solution. |
|-------------|-------------------------------|
| Almond Oil | 1.25 |
| Oleic Acid | 1.06 |
| Paraffine | 1.45 |
| Water | 0.0003 |
| Acetic Acid | 0.105 |

PHTHALIC ACIDS $C_6H_4(COOH)_2$.

SOLUBILITY IN WATER.

(Vaubel — J. pr. Ch. [2] 52, 73, '95; 59, 30, '99.)

| Acid. | t °. | Gms. per 100 Gms. Solution. |
|--------------------|------|-----------------------------|
| o Phthalic Acid | 14 | 0.54 |
| Iso Phthalic Acid | 25 | 0.013 |
| Tere Phthalic Acid | .. | almost insoluble |

SOLUBILITY OF o PHTHALIC ACID IN ALCOHOL AND IN ETHER AT 15°.

(Bourgoin — Ann. chim. phys. [5] 13, 406, '78.)

| Solvent. | Grams $C_6H_4(COOH)_2$ o per 100 Grams | |
|---------------------|--|----------|
| | Solution. | Solvent. |
| Absolute Alcohol | 9.156 | 11.70 |
| 90 per cent Alcohol | 10.478 | 10.08 |
| Ether | 0.679 | 0.684 |

PHTHALIC ANHYDRIDE $C_6H_4<\overset{CO}{\underset{CO}{>}}O$.

SOLUBILITY IN WATER.

(van der Stadt — Z. physik. Ch. 41, 358, '02.)

All determinations, except first three, made by the Synthetic Method.
See page 9.

| t °. | Grams $C_6H_4O_3$ per 100 Gms. | | Mol. per cent $C_6H_4O_3$. | t °. | Grams $C_6H_4O_3$ per 100 Gms. | | Mol. per cent $C_6H_4O_3$. |
|-------|--------------------------------|-----------|-----------------------------|-------|--------------------------------|-----------|-----------------------------|
| | Water. | Solution. | | | Water. | Solution. | |
| 0 | 0.00295 | 0.00295 | 0.00036 | 189.5 | 1076 | 91.66 | 56.73 |
| 25 | 0.6194 | 0.6150 | 0.0754 | 188.8 | 1265 | 92.68 | 60.63 |
| 50 | 1.630 | 1.604 | 0.198 | 187.1 | 1474 | 93.65 | 64.22 |
| 135.9 | 94.3 | 48.54 | 10.30 | 181.8 | 2332 | 95.88 | 73.95 |
| 165.4 | 210.0 | 67.75 | 20.36 | 176.2 | 3334 | 97.07 | 80.23 |
| 179.4 | 319.3 | 76.13 | 27.98 | 169.4 | 5745 | 98.28 | 87.49 |
| 186.2 | 449.6 | 81.81 | 35.37 | 130.9 | 37570 | 99.72 | 97.89 |
| 189.6 | 546.1 | 84.50 | 39.93 | 131.0 | 83010 | 99.86 | 99.02 |
| 191.0 | 821.5 | 89.19 | 50.00 | 131.2 | ∞ | 100.00 | 100.00 |
| 190.4 | 863.4 | 89.62 | 51.24 | | | | |

On page 362 of the original paper the solubility of $C_6H_4O_3$ at 0° is given as 0.2722 gram per 100 grams of solution.

SOLUBILITY OF PHTHALIC ANHYDRIDE IN CARBON BISULPHIDE.

(Arctowski — *Compt. rend.* 121, 123, '95; Etard — *Ann. chim. phys.* [7] 2, 570, '94.)

| t°. | Gms. C ₆ H ₄ O ₃ per 100 Gms. Solution. | t°. | Gms. C ₆ H ₄ O ₃ per 100 Gms. Solution. | t°. | Gms. C ₆ H ₄ O ₃ per 100 Gms. Solution. |
|--------|--|-----|--|-----|--|
| -112.5 | 0.013 | +10 | 0.3 | 70 | 2.3 |
| -93 | 0.013 | 20 | 0.7 | 90 | 3.7 |
| -77.5 | 0.016 | 30 | 0.8 | 100 | 5.0 |
| -40 | 0.03 | 40 | 1.2 | 120 | 8.0 |
| -20 | 0.06 | 50 | 1.3 | 140 | 13.3 |
| -10 | 0.10 | 60 | 1.7 | 160 | 20.7 |
| 0 | 0.20 | | | 180 | 30.2 |

PHYSOSTIGMINE SALICYLATE C₆H₄(OH)COOH.C₁₅H₂₁N₃O₂ and
Physostigmine Sulphate H₂SO₄(C₁₅H₂₁N₃O₂)₂.

SOLUBILITY IN WATER, ALCOHOL, ETC.
 (U. S. P.)

| Solvent. | t°. | Gms. per 100 Gms. Solvent. | |
|------------|-----|----------------------------|--------------|
| | | Salicylate. | Sulphate. |
| Water | 25 | 1.38 | very soluble |
| Water | 80 | 6.66 | " |
| Alcohol | 25 | 7.87 | " |
| Alcohol | 60 | 25.00 | " |
| Chloroform | 25 | 11.6 | " |
| Ether | 25 | 0.57 | 0.083 |

PICRIC ACID C₆H₂.OH.(NO₂)₃.

SOLUBILITY IN WATER.

(Dolinski — *Ber.* 38, 1836, '05; Findlay — *J. Ch. Soc.* 81, 1219, '02.)

| t°. | Gms. C ₆ H ₃ N ₃ O ₇ per 100 Grams | | | t°. | Gms. C ₆ H ₃ N ₃ O ₇ per 100 Grams | | |
|-----|--|-----------|-----------|-----|--|-----------|-----------|
| | Solution. | | Water. | | Solution. | | Water. |
| 0 | 0.67 (D.) | 0.68 (D.) | 1.05 (F.) | 60 | 2.77 (D.) | 2.81 (D.) | 3.17 (F.) |
| 10 | .80 | 0.81 | 1.10 | 70 | 3.35 | 3.47 | 3.89 |
| 20 | 1.10 | 1.11 | 1.22 | 80 | 4.22 | 4.41 | 4.66 |
| 30 | 1.38 | 1.40 | 1.55 | 90 | 5.44 | 5.72 | 5.49 |
| 40 | 1.75 | 1.78 | 1.98 | 100 | 6.75 | 7.24 | 6.33 |
| 50 | 2.15 | 2.19 | 2.53 | | | | |

Dolinski does not refer to the previous determinations of Findlay.

SOLUBILITY OF PICRIC ACID IN WATER AND IN AQUEOUS SALT SOLUTIONS AT 25°.

(Levin — Z. physik. Ch. 55, 520, '06.)

, One liter of aqueous solution contains 0.05328 gram mols. = 12.20 grams $C_6H_3.OH(NO_2)_3$ at 25°.

| Gm. Mols. Salt per Liter. | Gram Mols. Picric Acid per Liter in Aq. Solutions of: | | | | | |
|------------------------------|---|---------------------|-----------------------------------|---------|-----------------------------------|---------------------|
| | NaCl. | NaNO ₃ . | Na ₂ SO ₄ . | LiCl. | Li ₂ SO ₄ . | NH ₄ Cl. |
| 0.01 | 0.05524 | 0.05529 | 0.05604 | 0.05480 | 0.05661 | 0.05487 |
| 0.02 | 0.05559 | 0.05872 | 0.05872 | 0.05558 | 0.06053 | 0.05540 |
| 0.05 | 0.05729 | 0.06632 | 0.06632 | 0.05703 | 0.06691 | 0.05771 |
| 0.07 | 0.05862 | 0.07093 | 0.07093 | 0.05878 | 0.07013 | 0.05865 |
| 0.10 | 0.05902 | 0.07670 | 0.07670 | 0.06132 | 0.07437 | ... |
| 0.50 | 0.0790 | ... | ... | ... | 0.123 | ... |
| 1.00 | 0.1180 | ... | ... | ... | 0.149 | ... |

| Gm. Mols. Salt per Liter. | Grams Picric Acid per Liter in Aq. Solutions of: | | | | | |
|------------------------------|--|---------------------|-----------------------------------|-------|-----------------------------------|---------------------|
| | NaCl. | NaNO ₃ . | Na ₂ SO ₄ . | LiCl. | Li ₂ SO ₄ . | NH ₄ Cl. |
| 0.01 | 12.66 | 12.67 | 12.83 | 12.55 | 12.97 | 12.57 |
| 0.02 | 12.74 | 13.45 | 13.45 | 12.74 | 13.87 | 12.69 |
| 0.05 | 13.12 | 15.19 | 15.19 | 13.06 | 15.33 | 13.22 |
| 0.07 | 13.43 | 16.25 | 16.25 | 13.47 | 16.06 | 13.44 |
| 0.10 | 13.52 | 17.57 | 17.57 | 14.05 | 17.04 | ... |
| 0.50 | 18.09 | ... | ... | ... | 28.18 | ... |
| 1.00 | 26.98 | ... | ... | ... | 34.14 | ... |

Solubility in Aq. Cane Sugar.

Solubility in Aq. Grape Sugar.

| Gm. Mols. Sugar per Liter. | Picric Ac. per Liter Solution. | | Sp. Gr. Solution. | Gm. Mols. Grape Sugar per Liter. | Picric Acid per Liter Sol. | |
|----------------------------------|--------------------------------|-------|----------------------|--|----------------------------|-------|
| | Gm. Mols. | Gms. | | | G. Mols. | Gms. |
| 0.10 | 0.05202 | 11.92 | 1.0122 | 0.10 | 0.0530 | 12.14 |
| 0.25 | 0.04978 | 11.40 | 1.0319 | 0.25 | 0.0521 | 11.93 |
| 0.50 | 0.0482 | 11.04 | 1.0654 | 0.50 | 0.0509 | 11.66 |
| 1.00 | 0.0443 | 10.15 | 1.1294 | 1.00 | 0.0474 | 10.86 |

SOLUBILITY OF PICRIC ACID IN ABSOLUTE ALCOHOL.

(Behrend — Z. physik. Ch. 10, 265, '92.)

100 gms. sat. solution contain 5.53 grams $C_6H_3.N_3O_7$ at 12.3°, and 5.92 grams at 14.8°. Sp. Gr. of the latter solution = 0.8255.

SOLUBILITY OF PICRIC ACID IN BENZENE.

(Findlay.)

| t°. | Gms. $C_6H_3N_3O_7$ per 100 Gms. C_6H_6 . | Mols. $C_6H_3N_3O_7$ per 100 Mols. C_6H_6 . | t°. | Gms. $C_6H_3N_3O_7$ per 100 Gms. C_6H_6 . | Mols. $C_6H_3N_3O_7$ per 100 Mols. C_6H_6 . |
|------|--|--|------|--|--|
| 5 | 3.70 | 1.26 | 38.4 | 26.15 | 8.88 |
| 10 | 5.37 | 1.83 | 45 | 33.57 | 11.40 |
| 15 | 7.29 | 2.48 | 55 | 50.65 | 17.21 |
| 20 | 9.56 | 3.25 | 58.7 | 58.42 | 19.83 |
| 25 | 12.66 | 4.30 | 65 | 71.31 | 24.20 |
| 26.5 | 13.51 | 4.60 | 75 | 96.77 | 32.92 |
| 35 | 21.38 | 7.26 | | | |

SOLUBILITY OF PICRIC ACID IN ETHER.

(Bougault — J. pharm. chim. [6] 18, 116, '03; — Apoth.-Ztg. 21, 74, '06.)

| Solvent. | t°. | Gms. $C_6H_3N_3O_7$ per Liter. |
|--|-----|--------------------------------|
| Ether of Sp. Gr. 0.721 | 13 | 10.8 (B.) |
| Ether of Sp. Gr. 0.725 (0.8 pt. Ether per 100) | 13 | 36.8 " |
| Ether of Sp. Gr. 0.726 (1.0 pt. Ether per 100) | 13 | 40.0 " |
| Ether saturated with H_2O | 15 | 51.2 |
| H_2O saturated with Ether | 15 | 13.8 |

DISTRIBUTION OF PICRIC ACID AT 25° BETWEEN:

Water and Amyl Alcohol.

(Herz and Fischer — Ber. 37, 4747, '04.)

| Millimols $C_6H_3N_3O_7$ per 10 cc. | | Gms. $C_6H_3N_3O_7$ per 100 cc. | |
|-------------------------------------|----------------|---------------------------------|----------------|
| Aq. Layer. | Alcohol Layer. | Aq. Layer. | Alcohol Layer. |
| 0.0553 | 0.0930 | 0.127 | 0.213 |
| 0.0920 | 0.1850 | 0.211 | 0.424 |
| 0.1613 | 0.4127 | 0.369 | 0.946 |
| 0.1869 | 0.5182 | 0.428 | 1.188 |
| 0.3161 | 1.079 | 0.724 | 2.473 |
| 0.4471 | 1.638 | 1.024 | 3.753 |
| 0.5624 | 2.189 | 1.288 | 5.017 |
| 0.6423 | 2.549 | 1.472 | 5.839 |

Water and Toluene.

(H. and F. — Ber. 38, 1142, '05.)

| Millimols $C_6H_3N_3O_7$ per 10 cc. | | Gms. $C_6H_3N_3O_7$ per 100 cc. | |
|-------------------------------------|----------------|---------------------------------|----------------|
| Aq. Layer. | Toluene Layer. | Aq. Layer. | Toluene Layer. |
| 0.075 | 0.126 | 0.172 | 0.289 |
| 0.109 | 0.230 | 0.250 | 0.527 |
| 0.163 | 0.482 | 0.374 | 1.104 |
| 0.244 | 1.026 | 0.559 | 2.351 |
| 0.389 | 2.347 | 0.891 | 5.380 |
| 0.496 | 3.747 | 1.137 | 8.586 |
| 0.583 | 5.135 | 1.336 | 11.770 |

DISTRIBUTION OF PICRIC ACID AT 25° BETWEEN:

Water and Bromoform.

(Herz and Lewy — Z. Electrochem. 11, 820, '05.)

| Millimols $C_6H_3N_3O_7$ per 10 cc. | | Gms. $C_6H_3N_3O_7$ per 100 cc. | |
|-------------------------------------|------------------|---------------------------------|------------------|
| Aq. Layer. | Bromoform Layer. | Aq. Layer. | Bromoform Layer. |
| 0.321 | 0.365 | 0.736 | 0.836 |
| 0.401 | 0.515 | 0.919 | 1.180 |
| 0.475 | 0.655 | 1.088 | 1.501 |
| 0.575 | 0.871 | 1.317 | 1.995 |
| 0.674 | 1.14 | 1.545 | 2.612 |

Water and Chloroform.

(H. and L.)

| Millimols $C_6H_3N_3O_7$ per 10 cc. | | Gms. $C_6H_3N_3O_7$ per 100 cc. | |
|-------------------------------------|-------------------|---------------------------------|-------------------|
| Aq. Layer. | Chloroform Layer. | Aq. Layer. | Chloroform Layer. |
| 0.207 | 0.254 | 0.474 | 0.582 |
| 0.329 | 0.547 | 0.754 | 1.253 |
| 0.488 | 1.09 | 1.118 | 2.498 |
| 0.561 | 1.41 | 1.285 | 3.230 |
| 0.588 | 1.53 | 1.348 | 3.505 |

PHILOCARPINE HYDROCHLORIDE $C_{11}H_{16}N_2O_2.HCl$, Philocarpine Nitrate $C_{11}H_{16}N_2O_2.HNO_3$, and Piperine $C_{17}H_{19}NO_2$, in Several Solvents.

(U. S. P.)

| Solvent. | t°. | Grams per 100 Grams Solvent. | | |
|------------|-----|------------------------------|----------------------------|--------------------|
| | | $C_{11}H_{16}N_2O_2.HCl$ | $C_{11}H_{16}N_2O_2.HNO_3$ | $C_{17}H_{19}NO_2$ |
| Water | 25 | 333 | 25 | insoluble |
| Alcohol | 25 | 4.35 | 1.66 | 6.66 |
| Alcohol | 60 | 9.09 | 6.2 | 22.7 |
| Chloroform | 25 | 0.18 | ... | 58.8 |
| Ether | 25 | ... | ... | 2.8 |

SOLUBILITY OF PLATINUM ALLOYS IN NITRIC ACID.

(Winkler — Z. anal. Ch. 13, 369, '74.)

| Alloy. | Approx. per cent Pt in Alloy. | Grams Alloy Dissolved per 100 Grams HNO ₃ Solution of | | | |
|----------------|-------------------------------------|--|---------------|---------------|----------------|
| | | 1.398 Sp. Gr. | 1.298 Sp. Gr. | 1.190 Sp. Gr. | 1.298 Sp. Gr.: |
| Pt and Silver | 10 | 57 | 44 | 69 | 37 |
| " | 5 | 69 | 57 | 51 | 35 |
| " | 2.5 | 62 | 61 | 69 | .. |
| " | 1 | 75 | 70 | 76 | .. |
| Pt and Copper | 10 | 46 | 27 | 11 | 51 |
| " | 5 | 36 | 34 | 14 | 41 |
| " | 2.5 | 51 | 40 | 30 | .. |
| " | 1 | 52 | 41 | 37 | .. |
| Pt and Lead | 10 | 7 | 9 | 8 | .. |
| " | 5 | 8 | 9 | 10 | .. |
| " | 2.5 | 22 | 17 | 11 | .. |
| " | 1+ | 21 | 18 | 23 | .. |
| Pt and Bismuth | 10 | 14 | 19 | 4 | 3 |
| " | 5 | 21 | 20 | 6 | 18 |
| " | 2.5 | 25 | 42 | 8 | .. |
| " | 1 | 49 | 64 | 10 | .. |
| Pt and Zinc | 10 | 10 | 11 | 19 | 5 |
| " | 5 | 16 | 12 | 6 | 11 |
| " | 2.5 | 16 | 24 | 19 | .. |
| " | 1 | 20 | 32 | 37 | .. |

PLATINUM BROMIDE PtBr₄.100 grams sat. aqueous solution contain 0.41 gram PtBr₄ at 20°.

(Halberstadt — Ber. 17, 2962, '84.)

PLATINIC POTASSIUM BROMIDE K₂PtBr₆.100 grams sat. aqueous solution contain 2.02 grams K₂PtBr₆ at 20°.

(Halberstadt.)

PLATINIC DOUBLE CHLORIDES of Ammonium, Caesium, Potassium, Rubidium and Thallium.

SOLUBILITY IN WATER.

(Crookes — Chem. News 9, 37, 205, '64; Bunsen — Pogg. Ann. 113, 337, '61.)

| t°. | Grams per 100 Grams Water. | | | | |
|-----|---|-------------------------------------|------------------------------------|-------------------------------------|-------------------------------------|
| | (NH ₄) ₂ PtCl ₆ . | Cs ₂ PtCl ₆ . | K ₂ PtCl ₆ . | Rb ₂ PtCl ₆ . | Tl ₂ PtCl ₆ . |
| 0 | ... | 0.024 | 0.74 | 0.184 | ... |
| 10 | 0.666 (15°) | 0.050 | 0.90 | 0.154 | 0.0064 (15°) |
| 20 | ... | 0.079 | 1.12 | 0.141 | ... |
| 25 | ... | 0.095 | 1.26 | 0.143 | ... |
| 30 | ... | 0.110 | 1.41 | 0.145 | ... |
| 40 | ... | 0.142 | 1.76 | 0.166 | ... |
| 50 | ... | 0.177 | 2.17 | 0.203 | ... |
| 60 | ... | 0.213 | 2.64 | 0.253 | ... |
| 70 | ... | 0.251 | 3.19 | 0.329 | ... |
| 80 | ... | 0.291 | 3.79 | 0.417 | ... |
| 90 | ... | 0.332 | 4.45 | 0.521 | ... |
| 100 | 1.25 | 0.377 | 5.18 | 0.634 | 0.050 |

SOLUBILITY OF AMMONIUM PLATINIC CHLORIDE AND OF POTASSIUM PLATINIC CHLORIDE IN ALCOHOL AT 15°-20°.

(Fresenius; Peligot — Z. anal. Ch. 36, 322, '97.)

| Solvent | Gms. per Liter Solution. | | Solvent. | Gms. per Liter Solution. | |
|-------------|---|------------------------------------|-------------------------------------|---|------------------------------------|
| | (NH ₄) ₂ PtCl ₆ . | K ₂ PtCl ₆ . | | (NH ₄) ₂ PtCl ₆ . | K ₂ PtCl ₆ . |
| 55% Alcohol | 0.150 | ... | 95% Alcohol | 0.0037 | 0.030 |
| 76 " " | 0.067 | 0.026 | Abs. " " | ... | 0.0082-0.0023 |
| 85 " " | ... | 0.180 | 80 Vol. % Alcohol + 20 Vol. % Ether | ... | 0.027 |
| 90 " " | ... | 0.100 | Abs. Methyl Alcohol | ... | 0.072 |

PLATINO AMINES.

SOLUBILITY IN WATER.

(Cleve.)

| Amine. | Formula. | Gms. per 100 Gms. H ₂ O. | |
|-------------------------------------|---|-------------------------------------|-------------|
| Platino Semi Di Amine Chloride | Pt < $\begin{smallmatrix} (NH_2)_2Cl \\ Cl \end{smallmatrix}$ | 0.26 at 0° | 3.4 at 100° |
| Chloro Platin Amine Chloride | Cl ₂ Pt < $\begin{smallmatrix} NH_2Cl \\ NH_2Cl \end{smallmatrix}$ | 0.14 " | 3.0 " |
| Chloro Platin Semi Diamine Chloride | Cl ₂ Pt(NH ₂) ₂ Cl | 0.33 " | 1.54 " |

POTASSIUM ACETATE CH₃COOK.

SOLUBILITY IN WATER.

100 gms. sat. aq. solution contain 73.65 gms. CH₃COOK, or 100 gms. H₂O dissolve 286.3 gms. at 31.25°.

(Köhler — Z. Ver. Zuckerind. 47, 447, '97.)

100 gms. H₂O dissolve 188 gms. CH₃COOK at 5°, 229 gms. at 13.9°, 492 gms. at 62°.

(Osann.)

100 gms. 99 per cent ethyl alcohol dissolve 33.3 gms. CH₃COOK at 15°, and 50.0 gms. at 80°.

POTASSIUM (Di Hydrogen) ARSENATE KH₂AsO₄.

100 gms. sat. aq. solution contain 15.9 gms. KH₂AsO₄, or 100 gms. H₂O dissolve 18.86 gms. at 6°. Sp. Gr. of solution = 1.1134.

(Field — J. Ch. Soc. 11, 6, '59.)

POTASSIUM BENZOATE KC₇H₅O₂.3H₂O.

SOLUBILITY IN WATER.

(Paietta — Gazz. chim. ital. 36, 11, 67, '06.)

| t°. | 17.5° | 25° | 33.3° | 50° |
|---|-------|------|-------|------|
| Gms. KC ₇ H ₅ O ₂ per 100 Gms. Solution. | 41.4 | 42.4 | 44.0 | 46.6 |

SOLUBILITY OF POTASSIUM BORATES IN WATER AT 30°.

(Dukelski — Z. anorg. Chem. 50, 42, '06, complete references given.)

| Gms. per 100 Gms. Solution. | | Gms. per 100 Gms. Residue. | | Solid Phase. |
|-----------------------------|---------------------------------|----------------------------|---------------------------------|---|
| K ₂ O. | B ₂ O ₃ . | K ₂ O. | B ₂ O ₃ . | |
| 47.50 | ... | ... | ... | KOH.2H ₂ O |
| 46.36 | 0.91 | 46.13 | 9.02 | K ₂ O.B ₂ O ₃ .2½H ₂ O |
| 40.51 | 1.25 | 41.62 | 9.71 | " |
| 36.82 | 1.80 | 39.90 | 13.19 | " |
| 32.74 | 3.51 | 37.22 | 14.58 | " |
| 29.63 | 6.98 | 35.05 | 17.92 | " |
| 24.84 | 17.63 | 30.02 | 21.70 | " |
| 23.30 | 18.19 | 26.84 | 31.49 | K ₂ O.3B ₂ O ₃ .4H ₂ O |
| 16.21 | 13.10 | 25.12 | 33.18 | " |
| 11.78 | 9.82 | 20.57 | 26.43 | " |
| 9.18 | 8.00 | 22.38 | 31.30 | " |
| 6.22 | 9.13 | 20.87 | 31.06 | " |
| 7.73 | 13.37 | 22.21 | 36.24 | K ₂ O.2B ₂ O ₃ .4H ₂ O + K ₂ O.5B ₂ O ₃ .8H ₂ O |
| 7.81 | 13.28 | 17.50 | 34.18 | " |
| 7.71 | 13.21 | 11.49 | 34.81 | K ₂ O.5B ₂ O ₃ .8H ₂ O |
| 7.63 | 13.28 | 12.51 | 40.52 | " |
| 3.42 | 7.59 | 10.77 | 37.35 | " |
| 1.80 | 4.15 | 5.88 | 20.00 | " |
| 0.51 | 3.19 | 10.81 | 40.89 | " |
| 0.33 | 4.58 | 7.72 | 34.21 | K ₂ O.5B ₂ O ₃ .8H ₂ O + B(OH) ₃ |
| 0.31 | 4.46 | 3.91 | 30.68 | " |
| ... | 3.54 | ... | ... | " |

POTASSIUM (Fluo) BORIDE KBF₄.

100 gms. H₂O dissolve 0.44 gm. KBF₄ at 20°, and 6.27 gms. at 100°.

(Stolba — Chem. techn. Centr. Anz. 7, 459, '89.)

POTASSIUM BROMATE KBrO₃.

SOLUBILITY IN WATER.

(Kremers — Pogg. Ann. 97, 5, '56; Rammelsberg — *Ibid.* 55, 79, '42; Pohl — Sitzber. Akad. Wiss. Wien. 6, 595, '51.)

| t°. | Gms. KBrO ₃ per 100 Gms. | | t°. | Gms. KBrO ₃ per 100 Gms. | |
|-----|-------------------------------------|-----------|-----|-------------------------------------|-----------|
| | Water. | Solution. | | Water. | Solution. |
| 0 | 3.1 | 3.0 | 40 | 13.2 | 11.7 |
| 10 | 4.8 | 4.6 | 50 | 17.5 | 14.9 |
| 20 | 6.9 | 6.5 | 60 | 22.7 | 18.5 |
| 25 | 8.0 | 7.4 | 80 | 34.0 | 25.4 |
| 30 | 9.5 | 8.7 | 100 | 50.0 | 33.3 |

Sp. Gr. of solution saturated at 19.5° = 1.05.

SOLUBILITY OF POTASSIUM BROMATE IN AQUEOUS SOLUTIONS OF SODIUM NITRATE AND OF SODIUM CHLORIDE.

(Geffcken — Z. physik. Chem. 49, 296, '04.)

In Sodium Nitrate.

| Grams per Liter. | | Mols. KBrO ₃ per Liter. |
|---------------------|---------------------|---------------------------------------|
| NaNO ₃ . | KBrO ₃ . | |
| 0.0 | 78.79 | 0.4715 |
| 42.54 | 96.01 | 0.5745 |
| 85.09 | 108.6 | 0.6497 |
| 170.18 | 128.3 | 0.7680 |
| 255.27 | 150.9 | 0.9026 |
| 340.36 | 172.3 | 1.031 |

In Sodium Chloride.

| Grams per Liter. | | Mols. KBrO ₃ per Liter. |
|------------------|---------------------|---------------------------------------|
| NaCl. | KBrO ₃ . | |
| 0.0 | 78.79 | 0.4715 |
| 29.25 | 82.24 | 0.5220 |
| 58.50 | 93.87 | 0.5616 |
| 117.0 | 100.9 | 0.6042 |
| 175.5 | 104.3 | 0.6244 |
| 234.0 | 106.9 | 0.6400 |

POTASSIUM BROMIDE KBr.

SOLUBILITY IN WATER.

(Average curve from results of Meusser — Z. anorg. Chem. 44, 79, '05; Etard — Compt. rend. 98, 1432, '84; Ann. chim. phys. [7] 2, 526, '04; de Coppet — *Ibid.* [5] 30, 416, '83; Tilden and Shenstone — Phil. Trans. 175, 23, '84.)

| t°. | Grams KBr per 100 Grams | | t°. | Grams KBr per 100 Grams | |
|--------|-------------------------|--------|-----|-------------------------|--------|
| | Solution. | Water. | | Solution. | Water. |
| — 6.5 | 20.0 | 25.0 | 30 | 41.4 | 70.6 |
| — 8.5 | 26.5 | 35.7 | 40 | 43.0 | 75.5 |
| — 10.5 | 29.5 | 41.8 | 50 | 44.5 | 80.2 |
| — 11.5 | 31.2 | 45.3 | 60 | 46.1 | 85.5 |
| — 10 | 31.8 | 46.7 | 70 | 47.4 | 90.0 |
| — 5 | 33.3 | 50.0 | 80 | 48.7 | 95.0 |
| 0 | 34.9 | 53.5 | 90 | 49.8 | 99.2 |
| 5 | 36.1 | 56.5 | 100 | 51.0 | 104.0 |
| 10 | 37.3 | 59.5 | 110 | 52.3 | 109.5 |
| 15 | 38.5 | 62.5 | 140 | 54.7 | 120.9 |
| 20 | 39.5 | 65.2 | 181 | 59.3 | 145.6 |
| 25 | 40.4 | 67.7 | | | |

SOLUBILITY OF MIXTURES OF POTASSIUM BROMIDE AND AMMONIUM BROMIDE IN WATER AT 25°.

(Fock — Z. Kryst. Min. 28, 357, '97.)

| Grams per Liter Solution. | | Mol. per cent in Solution. | | Sp. Gr. of Solutions. | Mol. per cent in Solid Phase. | |
|---------------------------|-------|----------------------------|-------|-----------------------|-------------------------------|----------|
| NH ₄ Br. | KBr. | NH ₄ Br. | KBr. | | NH ₄ Br. | KBr. |
| 0.00 | 558.1 | 0.0 | 100 | 1.3756 | 0.00 | 100 |
| 6.4 | 554.2 | 1.38 | 98.62 | 1.3745 | 0.26 | 99.74 |
| 24.64 | 536.5 | 5.29 | 94.71 | 1.3733 | 1.27 | 98.73 |
| 51.34 | 516.8 | 10.77 | 89.23 | 1.3721 | 3.02 | 96.98 |
| 152.9 | 441.2 | 29.63 | 70.37 | 1.3711 | 8.42 | 91.58 |
| 262.2 | 347.3 | 47.84 | 52.16 | 1.3715 | 17.20 | 82.80 |
| 347.6 | 262.3 | 61.69 | 38.31 | 1.3753 | 27.98 | 72.02 |
| 381.4 | 260.3 | 64.03 | 35.97 | 1.3753 | 32.53 | 67.47 |
| 417.8 | 232.2 | 68.61 | 31.39 | 1.3766 | 39.45 | 60.55 |
| 432.5 | 222.3 | 70.27 | 29.73 | 1.3777 | variable | variable |
| 480.8 | 179.9 | 76.47 | 23.53 | 1.3766 | 98.53 | 1.47 |
| 577.3 | 0.0 | 100.0 | 0.0 | 1.3763 | 100.0 | 0.00 |

SOLUBILITY OF POTASSIUM BROMIDE IN AQUEOUS SOLUTIONS OF POTASSIUM HYDROXIDE.

(Ditte — Compt. rend. 124, 30, '97.)

| Grams per 1000 Grams H ₂ O. | | Grams per 1000 Grams H ₂ O. | |
|--|-------|--|-------|
| KOH. | KBr. | KOH. | KBr. |
| 36.4 | 558.4 | 277.6 | 248.1 |
| 113.5 | 433.6 | 434.7 | 137.1 |
| 177.2 | 358.1 | 579.6 | 64.8 |
| 231.1 | 281.2 | 806.9 | 33.4 |

SOLUBILITY OF MIXTURES OF POTASSIUM BROMIDE AND CHLORIDE AND OF MIXTURES OF POTASSIUM BROMIDE AND IODIDE IN WATER.

(Etard — Ann. chim. phys. [7] 3, 275, '97.)

Mixtures of KBr and KCl. Mixtures of KBr and KI.

| t°. | Grams per 100 Gms. Solution. | | Grams per 100 Grams Solution. | |
|-----|------------------------------|------|-------------------------------|------|
| | KBr. | KCl. | KBr. | KI. |
| -20 | 17.5 | 10.5 | 9.2 | 42.5 |
| 0 | 21.5 | 10.8 | 9.9 | 45.3 |
| 10 | 23.2 | 11.0 | 10.2 | 46.6 |
| 20 | 24.8 | 11.2 | 10.5 | 47.5 |
| 25 | 25.5 | 11.3 | 10.7 | 48.0 |
| 30 | 26.3 | 11.4 | 10.9 | 48.6 |
| 40 | 28.0 | 11.5 | 11.2 | 49.6 |
| 60 | 30.6 | 11.8 | 11.9 | 51.3 |
| 80 | 33.4 | 12.1 | 12.6 | 52.7 |
| 100 | 35.7 | 12.6 | 13.2 | 53.8 |
| 120 | 38.0 | 12.9 | 14.0 | 54.8 |
| 150 | 40.6 | 13.4 | 14.9 | 55.5 |

SOLUBILITY OF POTASSIUM BROMIDE IN AQUEOUS SOLUTIONS OF POTASSIUM CHLORIDE, AND OF POTASSIUM CHLORIDE IN AQUEOUS SOLUTIONS OF POTASSIUM BROMIDE, AT 25.2°.

(Touren — Compt. rend. 130, 1252, '00.)

KBr in Aq. KCl Solutions.

| Mols. per Liter. | | Grams per Liter. | |
|------------------|-------|------------------|-------|
| KCl. | KBr. | KCl. | KBr. |
| 0.0 | 4.761 | 0.0 | 567.0 |
| 0.67 | 4.22 | 50.0 | 502.5 |
| 0.81 | 4.15 | 60.4 | 494.2 |
| 1.35 | 3.70 | 100.7 | 440.7 |
| 1.48 | 3.54 | 110.4 | 421.6 |
| 1.61 | 3.42 | 120.0 | 407.2 |
| 1.70 | 3.34 | 126.8 | 397.7 |
| 2.46 | 2.50 | 183.5 | 297.7 |
| 3.775 | 0.525 | 281.6 | 625.3 |

KCl in Aq. KBr Solutions.

| Mols. per Liter. | | Grams per Liter. | |
|------------------|------|------------------|-------|
| KBr. | KCl. | KBr. | KCl. |
| 0.0 | 4.18 | 0.00 | 311.8 |
| 0.49 | 3.85 | 58.4 | 287.2 |
| 0.85 | 3.58 | 101.3 | 267.1 |
| 1.31 | 3.19 | 156.1 | 238.0 |
| 1.78 | 2.91 | 211.9 | 217.1 |
| 2.25 | 2.58 | 268.0 | 192.4 |
| 2.69 | 2.33 | 320.4 | 173.8 |

SOLUBILITY OF POTASSIUM BROMIDE IN AQUEOUS SOLUTIONS OF POTASSIUM NITRATE, AND OF POTASSIUM NITRATE IN AQUEOUS SOLUTIONS OF POTASSIUM BROMIDE, AT 14.5° AND AT 25.2°.

(Touren — Compt. rend. 130, 908, '00.)

KBr in Aqueous KNO₃ Solutions.

KNO₃ in Aq. KBr Solutions.

| Mols. per Liter. | | Grams per Liter. | | Mols. per Liter. | | Grams per Liter. | |
|--------------------|-------|--------------------|-------|--------------------|--------------------|------------------|--------------------|
| KNO ₃ . | KBr. | KNO ₃ . | KBr. | KBr. | KNO ₃ . | KBr. | KNO ₃ . |
| Results at 14.2°. | | | | Results at 14.20°. | | | |
| 0.0 | 4.332 | 0.0 | 515.9 | 0.0 | 2.228 | 0.0 | 225.4 |
| 0.362 | 4.156 | 36.6 | 494.9 | 0.356 | 2.026 | 42.4 | 205.0 |
| 0.706 | 4.093 | 71.4 | 487.4 | 0.784 | 1.835 | 93.4 | 185.7 |
| 1.235 | 3.939 | 124.9 | 469.1 | 1.092 | 1.730 | 130.0 | 175.0 |
| Results at 25.2°. | | | | 1.577 | 1.587 | 187.8 | 160.6 |
| 0.0 | 4.761 | 0.0 | 566.2 | 2.542 | 1.406 | 302.7 | 142.2 |
| 0.131 | 4.72 | 13.3 | 561.0 | 3.536 | 1.308 | 421.1 | 132.3 |
| Results at 25.2°. | | | | Results at 25.2°. | | | |
| 0.527 | 4.61 | 53.3 | 549.1 | 0.0 | 3.217 | 0.0 | 325.5 |
| 0.721 | 4.54 | 72.9 | 540.8 | 0.38 | 3.026 | 45.3 | 306.2 |
| 1.09 | 4.475 | 110.3 | 533.0 | 0.93 | 2.689 | 110.8 | 272.0 |
| 1.170 | 4.44 | 118.4 | 528.8 | 1.37 | 2.492 | 163.1 | 252.2 |
| 1.504 | 4.375 | 152.2 | 521.1 | 1.208 | 2.216 | 143.8 | 224.3 |
| | | | | 2.87 | 1.958 | 341.8 | 198.1 |
| | | | | 3.55 | 1.807 | 422.8 | 182.8 |

SOLUBILITY OF POTASSIUM BROMIDE IN ALCOHOLS AT 25°.

(de Bruyn — Z. physik. Chem. 10, 783, '92; Rohland — Z. anorg. Chem. 18, 327, '98.)

| Alcohol. | Grams KBr Dissolved by 100 Gms. Alcohol at: | |
|----------------|---|-------------------|
| | Room Temp. (R.). | 25° (de B.). |
| Methyl Alcohol | 1.92 | 1.51 Abs. Alcohol |
| Ethyl Alcohol | 0.28 (Sp. Gr. 0.81) | 0.13 " |
| Propyl Alcohol | 0.055 | ... |

SOLUBILITY OF POTASSIUM BROMIDE IN AQUEOUS ALCOHOL.

(Taylor — J. Physic. Ch. 1, 724, '96-'97.)

| Wt. per cent Alcohol in Solution. | Results at 30°. | | Results at 40°. | |
|-----------------------------------|-----------------------|--------|-----------------------|--------|
| | Gms. KBr per 100 Gms. | | Gms. KBr per 100 Gms. | |
| | Sat. Solution. | Water. | Sat. Solution. | Water. |
| 0 | 41.62 | 71.30 | 43.40 | 76.65 |
| 5 | 38.98 | 67.25 | 40.85 | 72.70 |
| 10 | 36.33 | 63.40 | 38.37 | 69.00 |
| 20 | 31.09 | 56.40 | 33.27 | 62.30 |
| 30 | 25.98 | 50.15 | 28.32 | 56.45 |
| 40 | 21.24 | 44.95 | 23.22 | 50.46 |
| 50 | 16.27 | 38.85 | 18.11 | 44.25 |
| 60 | 11.50 | 32.50 | 13.02 | 37.40 |
| 70 | 6.90 | 24.70 | 7.98 | 28.90 |
| 80 | 3.09 | 15.95 | 3.65 | 18.95 |
| 90 | 0.87 | 8.80 | 1.03 | 10.45 |

100 gm. acetone dissolve 0.023 gm. KBr at 25°.

(Krug and McElroy — J. anal. Chem. 6, 184, '92.)

SOLUBILITY OF POTASSIUM BROMIDE AT 25° IN:

(Herz and Knoch — *Z. anorg. Chem.* 45, 262, '05.)

| Aqueous Acetone. | | | | | Aqueous Glycerine. | | | | |
|--|----------------------------|--------------|---------------------------|-----------------------|-----------------------------------|----------------------|-------|----------------------|--|
| cc. Acetone per 100 cc. Solvent. | Per 100 cc. Sat. Solution. | | | Sp. Gr. Solutions. | Wt. % Glycerine in Solvent. | KBr per 100 cc. Sol. | | Sp. Gr. Solutions | |
| | Millimols KBr. | Gms. KBr. | Gms. H ₂ O. | | | Millimols. | Gms. | | |
| 0 | 481.3 | 57.3 | 80.6 | 1.3793 | 0 | 481.3 | 57.32 | 1.3793 | |
| 20 | 366.7 | 43.67 | 69.5 | 1.2688 | 13.28 | 444.3 | 52.91 | 1.3704 | |
| 30 | 310.5 | 36.98 | 62.97 | 1.2118 | 25.98 | 404.0 | 48.11 | 1.3655 | |
| 40 | 259.0 | 30.85 | 55.60 | 1.1558 | 45.36 | 340.5 | 40.55 | 1.3594 | |
| 50 | 202.9 | 24.16 | 47.60 | 1.0918 | 54.23 | 310.4 | 36.98 | 1.3580 | |
| 60 | 144.9 | 17.22 | 39.15 | 1.0275 | 83.84 | 219.25 | 26.11 | 1.3603 | |
| 70 | 95.3 | 11.35 | 29.78 | 0.9591 | 100.00 | 172.65 | 20.56 | 1.3691 | |
| 80 | 46.5 | 5.54 | 20.10 | 0.8942 | | | | | |
| 90 | 10.1 | 1.20 | 10.15 | 0.8340 | | | | | |

100 cc. sat. solution of potassium bromide in furfurol (C₄H₆O.CO.H) contain 0.139 gm. KBr at 25°.

(Walden — *Z. physik. Chem.* 55, 713, '06.)

POTASSIUM BUTYRATE C₃H₇COOK.

100 grams water dissolve 296.8 grams C₃H₇COOK, or 100 grams sat. solution contain 74.8 grams at 31.25°.

100 grams of an aq. solution saturated with sugar and C₃H₇COOK contain 49.19 grams sugar + 34.78 grams C₃H₇COOK + 16.03 grams H₂O at 31.25°.

(Köhler — *Z. Ver. Zuckerind.* 47, 447, '97.)

POTASSIUM CARBONATE K₂CO₃.

POTASSIUM (Bi) CARBONATE KHCO₃.

SOLUBILITY OF EACH IN WATER.

(Mulder; Dibbitts — *J. pr. Chem.* [2] 10, 430, '74.)

| t°. | Grams K ₂ CO ₃ per 100 Grams | | Grams KHCO ₃ per 100 Grams | |
|-----|--|--------|---------------------------------------|--------|
| | Solution. | Water. | Solution. | Water. |
| 0 | 47.2 | 89.4 | 18.3 | 22.4 |
| 10 | 52.2 | 109.0 | 21.7 | 27.7 |
| 20 | 52.8 | 112.0 | 24.9 | 33.2 |
| 30 | 53.3 | 114.0 | 28.1 | 39.0 |
| 40 | 54.0 | 117.0 | 31.2 | 45.3 |
| 60 | 56.0 | 127.0 | 37.5 | 60.0 |
| 100 | 60.9 | 156.0 | | |

Köhler (loc. cit.) gives for the solubility of K₂CO₃ in water, 48.91 grams K₂CO₃ per 100 grams solution, or 95.9 grams per 100 grams H₂O at 31.25°. In saturated sugar solution at the same temperature he finds 56.0 grams sugar + 22.24 grams K₂CO₃ + 21.76 grams H₂O per 100 grams sat. solution. Engel (*Ann. chim. phys.* [6] 13, 366, '88) finds 111.0 grams K₂CO₃ per 100 grams H₂O or 52.6 grams per 100 grams sat. solution at 0°. Sp. Gr. of solution = 1.542. For potassium bi carbonate he finds 23 grams KHCO₃ per 100 grams H₂O, or 18.7 grams per 100 grams solution. Sp. Gr. of solution = 1.127.

SOLUBILITY OF POTASSIUM BI CARBONATE IN AQUEOUS SOLUTIONS OF POTASSIUM CARBONATE AT 0°.

(Engel.)

| Milligram Mols. per 10 cc. Solution. | | Sp. Gr. of Solutions. | Grams per 100 cc. Solution. | |
|--|-------------------|-----------------------|----------------------------------|---------------------|
| $\frac{1}{2}$ K ₂ CO ₃ . | KHCO ₃ | | K ₂ CO ₃ . | KHCO ₃ . |
| 0.0 | 21.15 | 1.133 | 0.0 | 21.2 |
| 17.14 | 15.28 | 1.182 | 11.8 | 15.3 |
| 24.10 | 12.65 | 1.203 | 16.7 | 12.6 |
| 34.50 | 10.25 | 1.241 | 23.8 | 10.3 |
| 49.20 | 7.55 | 1.298 | 34.0 | 7.6 |
| 62.14 | 5.86 | 1.350 | 43.0 | 5.9 |
| 74.60 | 4.90 | 1.398 | 51.6 | 4.9 |
| 87.50 | 3.75 | 1.448 | 60.5 | 3.8 |
| 117.75 | 0.0 | 1.542 | 81.4 | 0.0 |

SOLUBILITY OF POTASSIUM CARBONATE IN AQUEOUS SOLUTIONS OF ETHYL AND PROPYL ALCOHOLS AT 20°.

(Linebarger — Am. Ch. J. 14, 380, '92; de Bruyn — Rec. trav. chim. 18, 87, '99.)

| In Aq. Ethyl Alcohol. | | | | In Aq. Propyl Alcohol. | |
|---|---|---|---|---|---|
| Wt. per cent C ₂ H ₅ OH in Solvent. | Gms. K ₂ CO ₃ per 100 Gms. Sat. Solution. | Wt. per cent C ₂ H ₅ OH in Solvent. | Gms. K ₂ CO ₃ per 100 Gms. Sat. Solution. | Wt. per cent C ₃ H ₇ OH in Solvent. | Gms. K ₂ CO ₃ per 100 Gms. Sat. Solution. |
| 10 | 24 | 50 | 2.5 | 40 | 4.3 |
| 20 | 16 | 55 | 1.8 | 45 | 3.0 |
| 30 | 10 | 60 | 1.1 | 50 | 2.0 |
| 40 | 5.6 | 65 | 0.8 | 55 | 1.3 |
| 45 | 4 | 69 | 0.4 | 60 | 0.8 |
| | | | | 65 | 0.5 |

100 grams glycerine of 1.225 Sp. Gr. dissolve 7.4 grams K₂CO₃.

(Vogel — N. Rep. Pharm. 16, 557, '67.)

POTASSIUM SODIUM CARBONATE KNaCO₃·6H₂O.100 gms. H₂O dissolve 184 gms. salt at 15°. Sp. Gr. of sol. = 1.366.

(Stolba — J. pr. Chem. 94, 406, '65.)

POTASSIUM URANYL CARBONATE 2K₂CO₃·(UO₂)CO₃.100 gms. H₂O dissolve 7.4 gms. salt at 15°.

(Ebelmen — Liebig's Ann. [3] 5, 189, '52.)

POTASSIUM CHLORATE KClO₃.**SOLUBILITY IN WATER.**

(Gay-Lussac — Ann. chim. phys. 11, 314, 1819; Pawlewski — Ber. 32, 1040, '99; above 100°, Tilden and Shenstone — Proc. Roy. Soc. 35, 345, '81; see also Blarez — Compt. rend. 112, 1213, '91; Etard — Ann. chim. phys. [7] 2, 526, 94; at 99°, Köhler — Z. anal. Chem. 18, 242, '79.)

| t °. | Gms. KClO ₃ per 100 Gms. | | | t °. | Gms. KClO ₃ per 100 Gms. | | |
|------|-------------------------------------|--------|------|------|-------------------------------------|---------|-------|
| | Solution. | Water. | | | Solution. | Water. | |
| 0 | 3.04 | 3.14 | 3.3* | 70 | 22.55 | 29.16 | 32.5* |
| 10 | 4.27 | 4.45 | 5.0 | 80 | 26.97 | 36.93 | 39.6 |
| 20 | 6.76 | 7.22 | 7.1 | 90 | 31.36 | 46.11 | 47.5 |
| 25 | 7.56 | 8.17 | 8.6 | 100 | 35.83 | 55.54 | 56.0 |
| 30 | 8.46 | 9.26 | 10.1 | 120 | 42.4 | 73.7 | 73.7 |
| 40 | 11.75 | 13.31 | 14.5 | 136 | 49.7 | 98.5 | 99.0 |
| 50 | 15.18 | 17.95 | 19.7 | 190 | 64.6 | 183.0 | 183.0 |
| 60 | 18.97 | 23.42 | 26.0 | 330 | 96.7 | 2930.00 | ... |

* Gay-Lussac.

POTASSIUM CHLORATE 240

SOLUBILITY OF POTASSIUM CHLORATE IN AQUEOUS SOLUTIONS OF POTASSIUM BROMIDE AT 13°.

(Blarez — Compt. rend. 112, 1213, '91.)

| Gms. per 100 Gms. Solution. | | Gms. per 100 Gms. Solution. | | Gms. per 100 Gms. Solution. | |
|-----------------------------|---------------------|-----------------------------|---------------------|-----------------------------|---------------------|
| KBr. | KClO ₃ . | KBr. | KClO ₃ . | KBr. | KClO ₃ . |
| 0.20 | 5.18 | 1.0 | 5.04 | 6.0 | 3.46 |
| 0.60 | 5.20 | 2.0 | 4.60 | 8.0 | 2.80 |
| 0.8 | 5.06 | 3.0 | 4.2 | 10.0 | 2.40 |
| | | 4.0 | 4.0 | | |

SOLUBILITY OF POTASSIUM CHLORATE IN AQUEOUS SOLUTIONS OF OTHER POTASSIUM SALTS AT 14°-15°.

(Blarez.)

| Salt. | Gms. per 100 Gms. Solution. | | Salt. | Gms. per 100 Gms. Solution. | |
|-------|-----------------------------|---------------------|--|-----------------------------|---------------------|
| | K Salt. | KClO ₃ . | | K Salt. | KClO ₃ . |
| KOH | 1.43 | 4.47 | KNO ₃ | 2.59 | 4.51 |
| KCl | 1.91 | 4.45 | " | 5.18 | 3.88 |
| " | 3.82 | 3.58 | K ₂ SO ₄ | 2.23 | 4.71 |
| KBr | 3.05 | 4.49 | " | 4.46 | 3.98 |
| " | 6.10 | 3.60 | K ₂ C ₂ O ₄ | 2.42 | 4.72 |
| KI | 4.25 | 4.59 | " | 4.85 | 3.93 |
| " | 8.51 | 3.65 | | | |

SOLUBILITY OF POTASSIUM CHLORATE IN AQUEOUS SOLUTIONS OF POTASSIUM CHLORIDE AT 20°.

(Winteler — Z. Electrochem. 7, 360, '00.)

| Sp. Gr. of Solutions. | Grams per Liter. | | Sp. Gr. of Solutions. | Grams per Liter. | |
|-----------------------|------------------|---------------------|-----------------------|------------------|---------------------|
| | KCl. | KClO ₃ . | | KCl. | KClO ₃ . |
| 1.050 | 0 | 71.1 | 1.098 | 120 | 24.5 |
| 1.050 | 10 | 58.0 | 1.108 | 140 | 22.5 |
| 1.050 | 20 | 49.0 | 1.119 | 160 | 21.0 |
| 1.054 | 40 | 39.5 | 1.130 | 180 | 20.0 |
| 1.064 | 60 | 34.0 | 1.140 | 200 | 20.0 |
| 1.075 | 80 | 30.0 | 1.168 | 250 | 20.0 |
| 1.086 | 100 | 27.0 | | | |

SOLUBILITY OF POTASSIUM CHLORATE IN AQUEOUS SOLUTIONS OF POTASSIUM NITRATE.

(Arrhenius — Z. physik. Chem. 11, 397, '93.)

Results at 19.85°.

Results at 23.87°.

| Mols. per Liter. | | Grams per Liter. | | Mols. per Liter. | | Grams per Liter. | |
|--------------------|---------------------|--------------------|---------------------|--------------------|---------------------|--------------------|---------------------|
| KNO ₃ . | KClO ₃ . | KNO ₃ . | KClO ₃ . | KNO ₃ . | KClO ₃ . | KNO ₃ . | KClO ₃ . |
| 0.0 | 0.570 | 0.0 | 69.88 | 0.0 | 0.645 | 0.0 | 79.09 |
| 0.125 | 0.529 | 12.65 | 64.86 | 0.5 | 0.515 | 50.59 | 63.14 |
| 0.25 | 0.492 | 25.29 | 60.33 | | | | |
| 1.0 | 0.374 | 101.19 | 45.85 | | | | |
| 2.0 | 0.328 | 202.38 | 40.22 | | | | |

POTASSIUM CHLORATE

SOLUBILITY OF POTASSIUM CHLORATE:

(Taylor — J. Physic. Chem. 1, 720, '96-'97; see also Gerardin — Ann. chim. phys. [3] 5, 148, '65.)

| Wt. per cent Alcohol or of Acetone in Solvent. | In Aqueous Alcohol. | | | | In Aqueous Acetone. | | | |
|---|---|--------|---|--------|---|--------|---|--------|
| | At 30°. | | At 40°. | | At 30°. | | At 40°. | |
| | Gms. KClO ₃ per 100 Gms. Solution. | Water. | Gms. KClO ₃ per 100 Gms. Solution. | Water. | Gms. KClO ₃ per 100 Gms. Solution. | Water. | Gms. KClO ₃ per 100 Gms. Solution. | Water. |
| 0 | 9.23 | 10.17 | 12.23 | 13.93 | 9.23 | 10.17 | 11.23 | 13.93 |
| 5 | 7.72 | 8.80 | 10.48 | 12.33 | 8.32 | 9.56 | 11.10 | 13.11 |
| 10 | 6.44 | 7.65 | 8.84 | 10.77 | 7.63* | 9.09 | 10.28* | 12.60 |
| 20 | 4.51 | 5.90 | 6.40 | 8.56 | 6.09 | 8.10 | 8.27 | 11.26 |
| 30 | 3.21 | 4.74 | 4.67 | 7.00 | 4.93 | 7.40 | 6.69 | 10.24 |
| 40 | 2.35 | 4.00 | 3.41 | 5.88 | 3.90 | 6.76 | 5.36 | 9.45 |
| 50 | 1.64 | 3.33 | 2.41 | 4.94 | 2.90 | 5.98 | 4.03 | 8.40 |
| 60 | 1.01 | 2.53 | 1.41 | 3.69 | 2.03 | 5.17 | 2.86 | 7.35 |
| 70 | 0.54 | 1.82 | 0.78 | 2.63 | 1.24 | 4.18 | 1.68 | 5.68 |
| 80 | 0.24 | 1.22 | 0.34 | 1.73 | 0.57 | 2.88 | 0.79 | 3.97 |
| 90 | 0.06 | 0.62 | 0.12 | 1.17 | 0.18 | 1.82 | 0.24 | 2.45 |

* Solvent, 9.09 Wt. per cent Acetone.

100 grams glycerine dissolve 3.5 grams KClO₃ at 15.5°.

100 grams sat. solution of KClO₃ in glycol contain 0.9 gram KClO₃.
(de Coninck — Bul. acad. roy. Belgique, 359, '05.)

POTASSIUM (Per) CHLORATE KClO₄.

SOLUBILITY IN WATER AND IN ALCOHOL.

(Muir — Chem. News, 33, 15, '76; Wenzel — Z. angew. Ch. 5, 691, '91.)

| In Water. (M.) | | | In Alcohol. (W.) | |
|----------------|--|--------------------------|--------------------------|---|
| t°. | Gms. KClO ₄ per 100 Gms. H ₂ O. | Sp. Gr. of Solutions. | Wt. per cent Alcohol. | Gms. KClO ₄ per 100 Gms. Alcohol. |
| 6 | 0.7 | 1.0005 | 97.2 | 0.0156 |
| 25 | 1.9 | 1.0123 | 95.8 | 0.020 |
| 50 | 6.45 | 1.0181 | 90.0 | 0.036 |
| 100 | 20.0 | 1.0660 | | |

POTASSIUM CHLORIDE KCl.

SOLUBILITY IN WATER.

(Average curve from the results of Meusser — Z. anorg. Chem. 44, 79, '05; at 31.25°, Köhler — Z. Ver. Zuckerind. 47, 447, '97; Andrae — J. pr. Chem. [2] 29, 456, '84; Gerardin — Ann. chim. phys. [4] 5, 137, '65; de Coppet *Ibid.* [5] 30, 411, '83; Etard *Ibid.* [7] 2, 526, '94; Mulder; above 100°, Tilden and Shenstone — Proc. Roy. Soc. (Lond.) 35, 345, '83.)

| t°. | Gms. KCl per 100 Gms. | | t°. | Gms. KCl per 100 Gms. | | t°. | Gms. KCl per 100 Gms. | |
|------|-----------------------|--------|-----|-----------------------|--------|-----------------|-----------------------|--------|
| | Solution. | Water. | | Solution. | Water. | | Solution. | Water. |
| -9 | 19.3 | 23.9 | 40 | 28.6 | 40.0 | 147 | 41.5 | 70.8 |
| -4.5 | 20.6 | 25.9 | 50 | 29.9 | 42.6 | 180 | 43.7 | 77.5 |
| 0 | 21.6 | 27.6 | 60 | 31.3 | 45.5 | Solid Phase Ice | | |
| 5 | 22.7 | 29.3 | 70 | 32.6 | 48.3 | -9 | 19.3 | 23.9 |
| 10 | 23.7 | 31.0 | 80 | 33.8 | 51.1 | -8 | 17.7 | 21.5 |
| 15 | 24.5 | 32.4 | 90 | 35.1 | 54.0 | -8 | 16.7 | 20.0 |
| 20 | 25.4 | 34.0 | 100 | 36.2 | 56.7 | -7 | 14.9 | 17.5 |
| 25 | 26.2 | 35.5 | 130 | 39.8 | 66.0 | -6 | 13.6 | 15.7 |
| 30 | 27.1 | 37.0 | | | | -5.5 | 12.5 | 14.3 |

Sp. Gr. of solution sat. at 0 = 1.150; at 15° = 1.172.

SOLUBILITY OF MIXTURES OF POTASSIUM CHLORIDE AND AMMONIUM CHLORIDE IN WATER AT 25°.

(Fock — Z. Kryst. Min. 28, 353, '97.)

| Grams per Liter Solution. | | Mol. per cent in Solution. | | Sp. Gr. of Solutions. | Mol. per cent in Solid Phase. | |
|---------------------------|-------|----------------------------|-------|-----------------------|-------------------------------|-------|
| NH ₄ Cl. | KCl. | NH ₄ Cl. | KCl. | | NH ₄ Cl. | KCl. |
| 0.00 | 311.3 | 0.00 | 100.0 | 1.1807 | 0.0 | 100 |
| 22.81 | 293.3 | 9.41 | 90.59 | 1.1716 | 1.21 | 98.79 |
| 35.39 | 278.7 | 15.04 | 84.96 | 1.1678 | 2.11 | 97.89 |
| 89.17 | 273.2 | 34.26 | 65.74 | 1.1591 | 6.18 | 93.82 |
| 127.8 | 234.6 | 46.59 | 53.41 | 1.1493 | 8.90 | 91.10 |
| 147.2 | 204.2 | 51.63 | 48.37 | 1.1461 | 10.53 | 89.47 |
| 197.3 | 157.7 | 63.56 | 36.44 | 1.1391 | 17.86 | 82.14 |
| 232.5 | 116.8 | 73.49 | 26.51 | 1.1326 | 60.20 | 39.80 |
| 244.5 | 123.0 | 73.48 | 26.52 | 1.1329 | 76.88 | 23.12 |
| 261.9 | 111.0 | 79.10 | 20.90 | 1.1245 | 97.51 | 2.49 |
| 259.0 | 102.2 | 82.14 | 17.86 | 1.1212 | 97.79 | 2.21 |
| 278.6 | 53.16 | 87.96 | 12.04 | 1.1009 | 98.85 | 1.15 |
| 320.7 | 31.24 | 93.45 | 6.55 | 1.0912 | 99.33 | 0.67 |
| 273.5 | 0.00 | 100.00 | 0.00 | 1.0768 | 100.0 | 0.00 |

SOLUBILITY OF MIXTURES OF POTASSIUM CHLORIDE AND POTASSIUM BROMIDE AT 25°.

(Fock.)

| Grams per Liter Solution. | | Milligram Mols. per Liter. | | Mol. per cent KCl in Solution. | Sp. Gr. of Solutions. | Mol. per cent KCl in Solid Phase. |
|---------------------------|-------|----------------------------|--------|--------------------------------|-----------------------|-----------------------------------|
| KBr. | KCl. | KBr. | KCl. | | | |
| 558.1 | 0.00 | 4686.2 | 0.0 | 0.0 | 1.3756 | 0.00 |
| 531.5 | 23.44 | 4462.7 | 314.2 | 6.16 | 1.3700 | 0.00 |
| 503.6 | 46.57 | 4228.5 | 624.3 | 12.86 | 1.3648 | 8.23 |
| 454.6 | 82.62 | 3817.8 | 1108.0 | 22.49 | 1.3544 | 15.68 |
| 379.6 | 136.6 | 3188.1 | 1830.7 | 36.48 | 1.3320 | 33.66 |
| 324.8 | 166.9 | 2727.6 | 2237.4 | 45.06 | 1.3119 | 63.51 |
| 218.0 | 213.9 | 1830.2 | 2868.0 | 60.30 | 1.2689 | 82.29 |
| 140.7 | 250.9 | 1181.1 | 3363.9 | 74.01 | 1.2455 | 88.04 |
| 47.5 | 291.7 | 398.8 | 3911.4 | 85.22 | 1.1977 | 96.98 |
| 0.0 | 311.3 | 0.0 | 4173.1 | 100.00 | 1.1756 | 100.00 |

SOLUBILITY OF POTASSIUM CHLORIDE IN AQUEOUS SOLUTIONS OF HYDROCHLORIC ACID AT 0°.

(Jeannel — Compt. rend. 103, 381, '86; Engel — Ann. chim. phys. [6] 13, 377, '88.)

| Milligram Mols. per 10 cc. | | Grams per 100 cc. Solution. | | Sp. Gr. of Solutions. |
|----------------------------|--------------|-----------------------------|-------|-----------------------|
| KCl. | HCl. | KCl. | HCl. | |
| 34.5 | 0.0 | 25.73 | 0.0 | 1.159 |
| 30.41 | 3.9 | 22.69 | 1.42 | 1.152 |
| 27.95 | 6.6 | 20.84 | 2.41 | 1.150 |
| 27.5 | 7.1 | 20.51 | 2.59 | 1.147 |
| 23.75 | 11.1 | 17.71 | 4.05 | 1.137 |
| 16.0 | 23.0 | 11.93 | 8.39 | 1.111 |
| 10.0 | 34.0 | 7.46 | 12.40 | 1.105 |
| 7.5 | 41.0 | 5.60 | 14.95 | 1.105 |
| 2.0 | 65.5 | 1.49 | 23.88 | 1.121 |
| 2.4 | 148.8 (sat.) | 1.52 | 54.26 | 1.224 |

100 cc. saturated HCl solution dissolve 1.9 grams KCl at 17°.

(Ditte — Compt. rend. 92, 242, '86.)

SOLUBILITY OF POTASSIUM CHLORIDE IN AQUEOUS POTASSIUM HYDROXIDE SOLUTIONS.

(Engel — Bull. soc. chim. [3] 6, 16, '91; Winteler — Z. Electrochem. 7, 360, '00.)

Results at 0°.

(Engel.)

| Mg. Mols. per 10 cc. Solution | | Sp. Gr. of Solution. | Gms. per 100 cc. Solution. | |
|----------------------------------|-------|-------------------------|-------------------------------|-------|
| KCl. | KOH. | | KCl. | KOH. |
| 35.5 | 0 | 1.159 | 26.83 | 0.0 |
| 31.0 | 2.375 | 1.146 | 23.44 | 1.33 |
| 28.3 | 4.7 | 1.153 | 21.39 | 2.64 |
| 23.0 | 9.9 | 1.172 | 17.39 | 5.56 |
| 18.38 | 15.1 | 1.195 | 13.89 | 8.46 |
| 14.43 | 20.0 | 1.216 | 10.91 | 11.23 |
| 11.43 | 24.63 | 1.239 | 8.64 | 13.83 |
| 8.98 | 29.25 | 1.261 | 6.78 | 16.43 |
| 6.28 | 35.13 | 1.294 | 4.74 | 19.72 |

Results at 20°.

(Winteler.)

| Gms. per 100 cc. Solution. | | Sp. Gr. of Solution. |
|-------------------------------|------|-------------------------|
| KCl. | KOH. | |
| 29.3 | 1.0 | 1.185 |
| 21.1 | 10.0 | 1.210 |
| 14.8 | 20.0 | 1.245 |
| 10.4 | 30.0 | 1.295 |
| 6.8 | 40.0 | 1.345 |
| 4.0 | 50.0 | 1.397 |
| 2.2 | 60.0 | 1.450 |
| 1.4 | 70.0 | 1.500 |
| 1.1 | 80.0 | 1.550 |
| 0.9 | 85.0 | 1.580 |

SOLUBILITY OF MIXTURES OF POTASSIUM CHLORIDE AND POTASSIUM IODIDE IN WATER.

(Etard — Ann. chim. phys. [7] 3, 275, '04.)

| t°. | Grams per 100 Gms. Solution. | | t°. | Grams per 100 Gms. Solution. | |
|-----|------------------------------|------|-----|------------------------------|------|
| | KCl. | KI. | | KCl. | KI. |
| 0 | 3.7 | 50.5 | 100 | 6.2 | 61.0 |
| 20 | 4.2 | 53.0 | 140 | 7.3 | 63.7 |
| 40 | 4.7 | 55.3 | 180 | 8.3 | 65.5 |
| 60 | 5.2 | 57.5 | 220 | 9.4 | 66.3 |
| 80 | 5.7 | 59.4 | 245 | 10.0 | 66.5 |

SOLUBILITY OF POTASSIUM CHLORIDE IN AQUEOUS MAGNESIUM CHLORIDE SOLUTIONS.

(Precht and Wittgen — Ber. 14, 1667, '81.)

| t°. | Grams KCl per 100 Grams Sat. Solution in: | | | | |
|-----|---|----------------------------|------------------------------|----------------------------|-------------------------|
| | 11% MgCl ₂ . | 15% MgCl ₂ . | 21.2% MgCl ₂ . | 30% MgCl ₂ . | 20% MgCl ₂ . |
| 10 | 14.3 | 9.9 | 5.3 | 1.9 | 4.2 KCl + 5.7 NaCl |
| 20 | 15.9 | 11.3 | 6.5 | 2.6 | 6.0 " + 5.9 " |
| 30 | 17.5 | 12.7 | 7.6 | 3.4 | 6.9 " + 6.0 " |
| 40 | 19.0 | 14.2 | 8.8 | 4.2 | 7.9 " + 6.1 " |
| 50 | 20.5 | 15.6 | 10.0 | 5.0 | 8.9 " + 6.3 " |
| 60 | 21.9 | 17.0 | 11.2 | 5.8 | 9.9 " + 6.4 " |
| 80 | 24.5 | 19.5 | 13.6 | 7.3 | 10.9 " + 6.6 " |
| 90 | 25.8 | 20.8 | 14.7 | 8.1 | 11.9 " + 6.7 " |
| 100 | 27.1 | 22.1 | 15.9 | 8.9 | 13.0 " + 6.9 " |

SOLUBILITY OF POTASSIUM CHLORIDE IN AQUEOUS SOLUTIONS OF POTASSIUM NITRATE, AND OF POTASSIUM NITRATE IN AQUEOUS SOLUTIONS OF POTASSIUM CHLORIDE, AT SEVERAL TEMPERATURES.

(Touren — Compt. rend. 139, 908, '00; Bodländer — Z. physik. Ch. 7, 360, '91; Nicol — Phil. Mag. (Lond.) 31, 369, '91; Soch — J. Physic. Ch. 2, 46, '98.)

KCl in Aq. KNO₃ Solutions at:

| 14.5° (T.). | | 17.5° (B.). | | 25.2° (T.). | | 20°, etc. (N.). | |
|--------------------------|-------|--------------------|--------------------|-------------|--------------------|-----------------|--------------------------------------|
| Gms. per Liter Solution. | | Sp. Gr. Solutions. | Gms. per Liter. | | Gms. per Liter. | | Gms. per 1000 Gms. H ₂ O. |
| KNO ₃ . | KCl. | | KNO ₃ . | KCl. | KNO ₃ . | KCl. | |
| 0 | 288.3 | 1.173 | 0.0 | 293.9 | 0.0 | 311.8 | 0.00 345.2 |
| 20.64 | 284.2 | 1.198 | 65.8 | 275.0 | 13.76 | 306.6 | 56.18 342.15 |
| 32.18 | 282.1 | 1.210 | 88.3 | 273.4 | 32.18 | 303.6 | 168.54 334.39 |
| 62.23 | 276.8 | 1.225 | 124.8 | 265.3 | 91.26 | 293.2 | at 25° |
| 82.77 | 273.5 | 1.236 | 148.3 | 259.8 | 122.7 | 287.2 | 225.8 341.3 |
| 115.9 | 270.7 | 1.239 | 152.2 | 259.6 | 141.4 | 284.2 | at 80° |
| 119.1 | 268.3 | 1.239 | 154.9 | 259.5 | 182.7 | 276.0 | 1175.0 402.0 |
| 123.4 | 267.2 | 1.241 | 153.3 | 262.4 | | | |

KNO₃ in Aq. KCl Solutions at:

| 14.5°. | | 25.2°. | | 20°. | |
|---------------------------|--------------------|---------------------------|--------------------|---------------------------------------|--------------------|
| Grams per Liter Solution. | | Grams per Liter Solution. | | Grams per 1000 Gms. H ₂ O. | |
| KCl. | KNO ₃ . | KCl. | KNO ₃ . | KCl. | KNO ₃ . |
| 0.0 | 225.4 | 0.0 | 325.5 | 0.0 | 311.1 |
| 13.58 | 219.8 | 19.39 | 312.3 | 82.9 | 256.8 |
| 31.63 | 208.2 | 49.22 | 288.7 | 165.8 | 221.7 |
| 65.64 | 185.2 | 100.7 | 254.0 | 248.7 | 202.0 |
| 132.6 | 159.5 | 155.2 | 224.4 | 310.8 | 501.6 |
| 164.4 | 153.3 | 207.3 | 203.9 | | |
| 196.5 | 144.0 | 226.8 | 196.9 | | |
| 236.9 | 137.1 | | | | |

KNO₃ in Aq. KCl at 20.5° (B.).

KCl in Aq. KNO₃ at 20.5° (B.).

| Gms. per 100 Gms. Solution. | | Sp. Gr. of Solutions. | Gms. per 100 Gms. Solution. | | Sp. Gr. of Solutions. |
|-----------------------------|--------------------|-----------------------|-----------------------------|-------|-----------------------|
| KCl. | KNO ₃ . | | KNO ₃ . | KCl. | |
| 0.0 | 27.68 | 1.1625 | 0.0 | 29.39 | 1.1730 |
| 4.72 | 24.39 | 1.1700 | 6.58 | 27.50 | 1.1980 |
| 7.74 | 22.44 | 1.1765 | 8.88 | 27.34 | 1.2100 |
| 12.23 | 20.23 | 1.1895 | 12.48 | 26.53 | 1.2250 |
| 15.15 | 18.96 | 1.1983 | 14.83 | 25.98 | 1.2360 |
| 19.61 | 17.67 | 1.2150 | 15.22 | 25.96 | 1.2390 |
| 22.17 | 17.11 | 1.2265 | 15.49 | 25.95 | 1.2388 |
| 24.96 | 16.79 | 1.2400 | 15.33 | 26.24 | 1.2410 |

SOLUBILITY OF MIXTURES OF POTASSIUM CHLORIDE AND POTASSIUM SULPHATE IN WATER.

| t°. | Gms. per 100 Gms. H ₂ O. | | Observer. | t°. | Gms. per 100 Gms. H ₂ O. | | Observer. |
|------|--|------------------------------------|-------------------------------|-----|--|------------------------------------|-------------|
| | KCl. | + K ₂ SO ₄ . | | | KCl. | + K ₂ SO ₄ . | |
| 10 | 30.9 | 1.32 | (Precht and Wittgen.) | 40 | 38.7 | 1.68 | (P. and W.) |
| 15.8 | 28.0 | 2.3 | (Kopp.) | 50 | 41.3 | 1.82 | " |
| 20 | 33.4 | 1.43 | (P. and W.) | 60 | 43.8 | 1.94 | " |
| 25 | 34.76 | 2.93 | (Van't Hoff and Meyerhoffer.) | 80 | 49.2 | 2.21 | " |
| 30 | 36.1 | 1.57 | (P. and W.) | 100 | 54.5 | 2.53 | " |

SOLUBILITY OF MIXTURES OF POTASSIUM CHLORIDE AND SODIUM CHLORIDE IN WATER.

((1) Precht and Wittgen — Ber. 14, 1667, '81; at 25° and at 80°, (3) Soch — J. Physic. Ch. 2, 46, '98;
(2) Etard — Ann. chim. phys. [7] 3, 275, '97.)

| t°. | Grams per 100 Grams H ₂ O. | | | | t°. | Grams per 100 Grams H ₂ O. | | | |
|-----|---------------------------------------|---------|---------|---------|-----|---------------------------------------|---------|---------|---------|
| | KCl. | | NaCl. | | | KCl. | | NaCl. | |
| 0 | 11.2(1) | 11.2(2) | 30.0(1) | 30.0(2) | 50 | 22.0(1) | 19.0(2) | 27.7(1) | 32.3(2) |
| 10 | 12.5 | 12.3 | 29.7 | 30.5 | 60 | 24.6 | 20.6 | 27.2 | 32.8 |
| 20 | 14.7 | 13.8 | 29.2 | 31.0 | 70 | 27.3 | 32.5 | 26.8 | 34.1 |
| 25 | 15.8(3) | 14.5 | 29.0(3) | 31.3 | 80 | 30.0(3) | 25.2(3) | 26.4(3) | 34.0 |
| 30 | 17.2 | 15.4 | 28.7 | 31.5 | 90 | 32.9 | 28.4 | 26.1 | 32.3 |
| 40 | 19.5 | 17.0 | 28.2 | 31.9 | 100 | 34.7 | 32.3 | 25.8 | 30.6 |

NOTE. — Page and Keightly, Rudorff and also Nicol, give single determinations which lie nearer the results of Precht and Wittgen than to those of Etard.

SOLUBILITY OF POTASSIUM CHLORIDE IN AQUEOUS SOLUTIONS OF SODIUM CHLORIDE, AND OF SODIUM CHLORIDE IN AQUEOUS SOLUTIONS OF POTASSIUM CHLORIDE, AT 20°.

(Nicol — Phil. Mag. (Lond.) 31, 369, '91.)

KCl in Aq. NaCl Solutions.

| Grams per 100 Grams H ₂ O. | |
|---------------------------------------|-------|
| NaCl. | KCl. |
| 0.0 | 34.52 |
| 6.5 | 29.37 |
| 13.0 | 4.71 |
| 19.5 | .42 |

NaCl in Aq. KCl Solutions.

| Grams per 100 Grams H ₂ O. | |
|---------------------------------------|-------|
| KCl. | NaCl. |
| 0.0 | 35.91 |
| 4.14 | 34.39 |
| 8.29 | 32.71 |
| 12.42 | 31.30 |

100 gms. 40 per cent by wt. alcohol dissolve 5.87 gms. KCl + 12.25 gms. NaCl at 25°.

100 gms. 40 per cent by wt. alcohol dissolve 5.29 gms. KNO₃ + 10.06 gms. KCl at 25°.

(Soch — J. Physic. Ch. 2, 46, '98.)

100 gms. abs. ethyl alcohol dissolve 0.034 gm. KCl at 18.5°.

100 gms. abs. methyl alcohol dissolve 0.5 gm. KCl at 18.5°.

(de Bruyn — Z. physik. Ch. 10, 783, '92; Rohland — Z. anorg. Ch. 18, 327, '98.)

SOLUBILITY OF POTASSIUM CHLORIDE IN AQUEOUS ALCOHOL.

(Gerardin — Ann. chim. phys. [4] 5, 140, '65.)

Interpolated from the original results.

| t°. | Grams KCl per 100 Gms. Aq. Alcohol of Sp. Gr.: | | | | | | | |
|-----|--|----------------------------|----------------------------|----------------------------|--------------------------|-------------------------|--------------------------|--------------------------|
| | 0.9904 = 5.5 Wt. %. | 0.9848 = 9.35 Wt. %. | 0.9793 = 13.6 Wt. %. | 0.9726 = 19.1 Wt. %. | 0.9573 = 30 Wt. %. | 0.939 = 40 Wt. %. | 0.8967 = 60 Wt. %. | 0.8244 = 90 Wt. %. |
| 0 | 23.4 | 19.5 | 15.5 | 11.5 | 7.0 | 4.0 | 1.7 | 0.0 |
| 5 | 25.0 | 21.0 | 16.8 | 12.8 | 8.0 | 4.8 | 2.2 | 0.0 |
| 10 | 26.4 | 22.5 | 18.0 | 14.0 | 9.0 | 5.6 | 2.7 | 0.0 |
| 15 | 26.8 | 24.0 | 19.2 | 15.2 | 10.0 | 6.4 | 3.1 | 0.04 |
| 20 | 29.1 | 25.3 | 20.3 | 16.1 | 10.8 | 7.2 | 3.5 | 0.06 |
| 25 | 30.4 | 26.8 | 21.5 | 17.1 | 11.6 | 7.9 | 3.9 | 0.08 |
| 30 | 31.7 | 28.0 | 22.6 | 18.2 | 12.5 | 8.5 | 4.2 | 0.10 |
| 40 | 34.3 | 30.8 | 24.8 | 20.0 | 14.0 | 9.9 | 4.8 | 0.20 |
| 50 | 37.0 | 33.5 | 27.0 | 21.8 | 15.5 | 10.8 | 5.2 | 0.30 |
| 60 | ... | ... | ... | ... | 16.8 | 11.8 | 5.5 | 0.40 |

SOLUBILITY OF POTASSIUM CHLORIDE IN AQUEOUS ALCOHOL AT:

15°.

(Schiff — Liebig's Ann. 118, 365, '61.)

14.5°.

(Bodländer — Z. physik. Ch. 7, 316, '91.)

| Sp. Gr. of Alcohol. | Wt. per cent Alcohol. | G. KCl per 100 g. Aq. Alcohol. | Sp. Gr. of Sat. Solutions. | Grams per 100 cc. Solution. | | |
|---|-----------------------------|--------------------------------------|----------------------------------|-----------------------------------|-------------------|-------|
| | | | | C ₂ H ₅ OH. | H ₂ O. | KCl. |
| 0.984 | 10 | 19.8 | 1.1720 | ... | 88.10 | 29.10 |
| 0.972 | 20 | 14.7 | 1.1542 | 2.79 | 85.78 | 26.85 |
| 0.958 | 30 | 10.7 | 1.1365 | 4.98 | 84.00 | 24.67 |
| 0.940 | 40 | 7.7 | 1.1075 | 10.56 | 79.63 | 20.56 |
| 0.918 | 50 | 5.0 | 1.1085 | 15.57 | 75.24 | 17.24 |
| 0.896 | 60 | 2.8 | 1.0545 | 20.66 | 70.52 | 14.27 |
| 0.848 | 80 | 0.45 | 1.0455 | 24.25 | 67.05 | 13.25 |
| Gerardin's results at 15° agree well with the above deter- minations. | | | 0.9695 | 40.42 | 50.18 | 6.35 |
| | | | 0.9315 | 48.73 | 40.60 | 3.82 |
| | | | 0.8448 | 68.63 | 15.55 | 0.30 |

30° and 40°.

(Bathrick — J. Physic. Chem. 1, 160, '96.)

| Wt. per cent Alcohol. | Gms. KCl per 100 Gms. Aq. Alcohol. | | Wt. per cent Alcohol. | Gms. KCl per 100 Gms. Aq. Alcohol. | |
|-----------------------------|---------------------------------------|---------|-----------------------------|---------------------------------------|---------|
| | At 30°. | At 40°. | | At 30°. | At 40°. |
| 0 | 38.9 | 41.8 | 43.1 | 11.1 | 13.1 |
| 5.28 | 33.9 | 35.9 | 55.9 | 6.8 | 8.2 |
| 9.43 | 30.2 | 33.3 | 65.9 | 3.6 | 4.1 |
| 16.9 | 24.9 | 27.6 | 78.1 | 1.3 | 1.6 |
| 25.1 | 19.2 | 21.8 | 86.2 | 0.4 | 0.5 |
| 34.1 | 15.6 | 17.2 | | | |

SOLUBILITY OF POTASSIUM CHLORIDE IN AQUEOUS ACETONE SOLUTIONS.

(Snell — J. Physic. Ch. 2, 484, '98; at 20°, Herz and Knoch — Z. anorg. Ch. 41, 317, '04.)

| Per cent Acetone in Solvent. | At 20°. KCl per 100 cc. Solution. | | At 30°. Gms. per 100 Gms. Solution. | | At 40°. Gms. per 100 Gms. Solution. | | At 50°. Gms. per 100 Gms. Solution. | |
|---------------------------------------|---|--------|---|-------|---|-------|---|-------|
| | Millimols. | Grams. | Acetone. | KCl. | Acetone. | KCl. | Acetone. | KCl. |
| 0 | 410.5 | 30.62 | 0.0 | 27.27 | 0.0 | 28.69 | 0.0 | 30.0 |
| 9.1 | 351.7 | 26.23 | 6.96 | 23.42 | 6.79 | 25.33 | ... | ... |
| 20 | 286.6 | 21.38 | 16.22 | 18.90 | 15.75 | 21.28 | ... | ... |
| 30 | 223.7 | 16.69 | 25.45 | 15.06 | two layers | | 25.67 | 14.42 |
| 40 | 166.5 | 12.42 | 35.52 | 11.31 | " | | 36.03 | 9.93 |
| 50 | 115.4 | 8.61 | 45.98 | 8.04 | " | | 46.46 | 7.07 |
| 60 | 71.2 | 5.31 | 56.91 | 5.12 | " | | 57.37 | 4.38 |
| 70 | 38.5 | 2.87 | 68.18 | 2.60 | " | | 68.56 | 2.22 |
| 80 | 12.9 | 0.96 | 78.43 | 0.76 | 79.34 | 0.58 | 79.25 | 0.94 |
| 90 | 2.0 | 0.15 | 89.88 | 0.13 | 89.84 | 0.16 | 81° + sat. sol. | |
| 100 | 0.0 | 0.0 | 100.0 | 0.00 | 100.00 | 0.00 | | |

NOTE. — For the 20° results the per cent acetone in the solvent is stated in terms of volume per cent, and the concentration of the second solution is 10 per cent instead of 9.1 which is the concentration of the solvent for the corresponding results at the other temperatures.

AT THE TEMPERATURE 40° AND FOR CONCENTRATIONS OF ACETONE BETWEEN 20 AND 80 PER CENT THE SATURATED SOLUTION SEPARATES INTO TWO LAYERS HAVING THE FOLLOWING COMPOSITIONS:

Upper Layer.

| Grams per 100 Grams Solution. | | |
|-------------------------------|-------------------------------------|-------|
| H ₂ O. | (CH ₃) ₂ CO. | KCl. |
| 55.2 | 31.82 | 12.99 |
| 53.27 | 35.44 | 11.29 |
| 51.23 | 48.50 | 10.27 |
| 50.3+ | 39.88 | 9.77 |
| 48.02 | 43.18 | 8.79 |
| 46.49 | 45.34 | 8.17 |
| 58.99 | 25.24 | 15.77 |

Lower Layer.

| Grams per 100 Grams Solution. | | |
|-------------------------------|-------------------------------------|------|
| H ₂ O. | (CH ₃) ₂ CO. | KCl. |
| 28.14 | 69.42 | 2.44 |
| 30.96 | 65.97 | 3.07 |
| 32.64 | 63.79 | 3.56 |
| 34.07 | 62.01 | 3.92 |
| 37.44 | 57.67 | 4.89 |
| 38.68 | 56.17 | 5.25 |
| 23.66 | 74.91 | 1.43 |

100 cc. sat. solution of potassium chloride in furfurol (C₄H₃O.CO.H) contain 0.085 gm. KCl at 25°.

(Walden — Z. physik. Ch. 55, 713, '06.)

POTASSIUM CHLORIDE 248

SOLUBILITY OF POTASSIUM CHLORIDE IN AQUEOUS SOLUTIONS OF GLYCERINE AT 25°.

(Herz and Knoch — Z. anorg. Ch. 45, 267, '05.)

Sp. Gr. of Glycerine at 25°/4° = 1.2555; Impurity about 1.5%.

| Wt. per cent Glycerine in Solvent. | KCl per 100 cc. Solution. | | Sp. Gr. of Solutions. | Wt. per cent Glycerine in Solvent. | KCl per 100 cc. Solution. | | Sp. Gr. of Solutions. |
|--|------------------------------|--------|--------------------------|--|------------------------------|--------|--------------------------|
| | Millimols. | Grams. | | | Millimols. | Grams. | |
| 0 | 424.5 | 31.66 | 1.180 | 54.23 | 238.5 | 17.79 | 1.219 |
| 13.28 | 383.4 | 28.61 | 1.185 | 83.84 | 149.0 | 11.11 | 1.259 |
| 25.98 | 339.3 | 25.31 | 1.194 | 100.00 | 110.6 | 8.25 | 1.286 |
| 45.36 | 271.4 | 20.24 | 1.211 | | | | |

100 grams H₂O dissolve 246.5 grams sugar + 44.8 grams KCl at 31.25°, or 100 grams of the sat. solution contain 62.28 grams sugar + 11.33 grams KCl.

(Köhler — Z. Ver. Zuckerind. 47, 447, '97.)

POTASSIUM CHROMATE K₂CrO₄.

POTASSIUM (Di) CHROMATE K₂Cr₂O₇.

SOLUBILITY OF EACH IN WATER.

(Alluard — Compt. rend. 59, 500, '64; Nordenskjöld and Lindström — Pogg. Ann. 136, 314, '69; Etard — Ann. chim. phys. [7] 2, 527, '94; Kremers — Pogg. Ann. 92, 497, '54; Tilden and Shenstone — Phil. Trans. 23, 1884.)

| t°. | Potassium Chromate. | | | Potassium Di Chromate. | |
|-----|----------------------------|-------|-------|----------------------------|-----|
| | Grams per 100 Grams Water. | | | Grams per 100 Grams Water. | |
| 0 | 58.2* | 59.3† | 60.2‡ | 5* | 5§ |
| 10 | 60.0 | 61.2 | 62.5 | 7 | 7 |
| 20 | 61.7 | 63.2 | 64.5 | 12 | 12 |
| 25 | 62.5 | 64.2 | 64.5 | 16 | 16 |
| 30 | 63.4 | 65.2 | 66.5 | 20 | 20 |
| 40 | 65.2 | 67.0 | 68.6 | 26 | 27 |
| 50 | 66.8 | 69.0 | 70.6 | 34 | 37 |
| 60 | 68.6 | 71.0 | 72.7 | 43 | 47 |
| 70 | 70.4 | 73.0 | 74.8 | 52 | 58 |
| 80 | 72.1 | 75.0 | 76.9 | 61 | 70 |
| 90 | 73.9 | 77.0 | 79.0 | 70 | 82 |
| 100 | 75.6 | 79.0 | 82.2 | 80 | 97 |
| 125 | 79.0 | ... | ... | 110 | 145 |
| 150 | 83.0 | ... | ... | 143 | 205 |

* Etard.

† Alluard.

‡ N. and L.

§ A., K., T. and S.

SOLUBILITY OF POTASSIUM CHROMATES IN WATER AT 30°.

(Schreinemaker — Z. physik. Ch. 55, 83, '06.)

| Composition in Wt. per cent of: | | | | Solid Phase. |
|---------------------------------|----------------------------|-----------------------------|----------------------------|--|
| The Solution. | | The Residue. | | |
| Per cent CrO ₃ | Per cent K ₂ O. | Per cent CrO ₃ . | Per cent K ₂ O. | |
| 0 | ± 47 | ... | ... | KOH.2H ₂ O |
| 0.0 | 47.16 | 12.59 | 47.54 | K ₂ CrO ₄ |
| 0.1775 | 34.602 | 10.93 | 37.47 | " |
| 1.351 | 26.602 | 16.482 | 32.532 | " |
| 5.598 | 20.584 | 37.131 | 39.922 | " |
| 15.407 | 19.225 | 27.966 | 29.377 | " |
| 20.67 | 19.17 | ... | ... | K ₂ CrO ₄ + K ₂ Cr ₂ O ₇ |
| 19.096 | 17.30 | 37.64 | 22.61 | K ₂ Cr ₂ O ₇ |
| 11.35 | 7.88 | ... | ... | " |
| 17.93 | 3.412 | 25.85 | 7.82 | " |
| 43.51 | 3.01 | 49.45 | 9.91 | " |
| 44.46 | 3.245 | 53.94 | 12.40 | K ₂ Cr ₂ O ₇ + K ₂ Cr ₂ O ₁₀ |
| 46.368 | 2.823 | 60.314 | 12.935 | K ₂ Cr ₂ O ₁₀ |
| 49.357 | 2.353 | 63.044 | 11.684 | K ₂ Cr ₂ O ₁₀ + K ₂ Cr ₄ O ₇ |
| 53.215 | 1.360 | 62.958 | 8.002 | K ₂ Cr ₄ O ₁₃ |
| 62.55 | 0.796 | 67.944 | 6.731 | " |
| 62.997 | 0.621 | 70.0 | 4.0 | K ₂ Cr ₄ O ₁₃ + CrO ₃ |
| 62.28 | 0.0 | ... | ... | CrO ₃ |

100 gms. sat. solution in glycol C₂H₄(OH)₂.H₂O contain 1.7 gms. K₂CrO₄ at 15.4°.

100 gms. sat. solution in glycol C₂H₄(OH)₂.H₂O contain 6.0 gms. K₂Cr₂O₇ at 14.6°.

(de Coninck — Bull. acad. roy. Belgique, 257, '05.)

POTASSIUM CITRATE C₃H₄(OH)(COOK)₃.H₂O.

SOLUBILITY IN WATER AND IN SATURATED SUGAR SOLUTION AT 31.25°.

(Köhler — Z. Ver. Zuckerind. 47, 447, '97.)

100 gms. H₂O dissolve 169.7 gms. C₆H₅O₇K₃, or 100 gms. sat. solution contain 61.11 gms.

100 gms. H₂O dissolve 198.3 gms. C₆H₅O₇K₃ + 303.9 gms. sugar, or 100 gms. sat. solution contain 32.83 gms. C₆H₅O₇K₃ + 50.3 gms. sugar.

POTASSIUM CYANATE KCNO.

SOLUBILITY IN ALCOHOLIC MIXTURES.

(Erdmann — Ber. 26, 2439, '93.)

| Solvent. | Grams KCNO per Liter Solvent at b. pt. |
|--|--|
| 80 per cent Alcohol + 20 per cent Water | 62 |
| 80 per cent Alcohol + 20 per cent Methyl Alcohol | 76 |
| 80 per cent Alcohol + 10 per cent Acetone | 82 |

POTASSIUM CYANIDE KCN.

100 gms. H₂O dissolve 122.2 gms. KCN, or 100 gms. sat. solution contain 55.0 gms. KCN at 103.3°.

100 gms. abs. ethyl alcohol dissolve 0.87 gm. KCN at 19.5°.

100 gms. abs. methyl alcohol dissolve 4.91 gms. KCN at 19.5°.

(de Bruyn — Z. physik. Ch. 10, 783, '92.)

100 gms. glycerine dissolve 32 gms. KCN at 15.5°.

POTASSIUM CYANIDES

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POTASSIUM CHROMOCYANIDE $K_2Cr(CN)_6$.100 gms. H_2O dissolve 32.33 gms. $K_2Cr(CN)_6$ at 20° .

(Moissan — Ann. chim. phys. [6] 4, 136, '85; Christensen — J. pr. Ch. [2] 31, 166, '85.)

POTASSIUM CHROMISULPHOCYANIDE $K_2Cr(SCN)_6 \cdot 4H_2O$.100 gms. H_2O dissolve 139 gms. salt.

(Karsten — Ann. Suppl. 3, 170.)

POTASSIUM CARBONYL FERROCYANIDE $K_3FeCO(CN)_6 \cdot 3\frac{1}{2}H_2O$.100 gms. H_2O dissolve 148 gms. salt at 16° .

(Müller — Compt. rend. 104, 992, '87.)

POTASSIUM FERRIOYANIDE $K_3Fe(CN)_6$.**POTASSIUM FERROCYANIDE** $K_4Fe(CN)_6 \cdot 3H_2O$.

SOLUBILITY OF EACH IN WATER.

(Wallace — J. Ch. Soc. 7, 80, '85; Etard — Ann. chim. phys. [7] 2, 526, '94; Schiff — Liebig's Ann. 113, 350, '60; Michel and Krafft — Ann. chim. phys. [3] 41, 478, '58; Thomsen.)

NOTE. — The available determinations fall very irregularly when plotted on cross-section paper, and the following figures, which are averages, are therefore hardly more than rough approximations to the true amounts. The figures under $K_4Fe(CN)_6$ show the limits between which the correct values probably lie.

| t °. | Grams per 100 Gms. H_2O . | | | t °. | Grams per 100 Gms. H_2O . | | |
|------|-----------------------------|-----------------|-----|-------|-----------------------------|-----------------|-----|
| | $K_3Fe(CN)_6$. | $K_4Fe(CN)_6$. | | | $K_3Fe(CN)_6$. | $K_4Fe(CN)_6$. | |
| 0 | 31 | 13 | ... | 40 | 60 | 38 | 70 |
| 10 | 36 | 20 | 20 | 60 | 66 | 52 | 83 |
| 20 | 43 | 25 | 40 | 80 | ... | 66 | 89 |
| 25 | 46 | 28 | 48 | 100 | ... | 76 | 91 |
| 30 | 50 | 32 | 57 | 104.4 | 82.6 | ... | ... |

POTASSIUM FLUORIDE $KF \cdot 2H_2O$.

100 gms. H_2O dissolve 92.3 gms. KF , or 100 gms. sat. solution contain 48 gms. KF at 18° . Sp. Gr. of solution = 1.502.

(Mylius and Funk — Ber. 30, 1718, '97.)

SOLUBILITY OF POTASSIUM FLUORIDE IN HYDROFLUORIC ACID AT 21° .

(Ditte — Compt. rend. 123, 1282, '96.)

| Gms. per 100 Gms. H_2O . | | Gms. per 100 Gms. H_2O . | | Gms. per 100 Gms. H_2O . | |
|----------------------------|------|----------------------------|-------|----------------------------|-------|
| HF. | KF. | HF. | KF. | HF. | KF. |
| 0.0 | 96.3 | 9.25 | 29.9 | 20.68 | 38.4 |
| 1.21 | 72.0 | 11.36 | 29.6 | 28.60 | 46.9 |
| 1.61 | 61.0 | 12.50 | 30.5 | 41.98 | 61.8 |
| 3.73 | 40.4 | 13.95 | 31.4 | 53.71 | 74.8 |
| 4.03 | 32.5 | 15.98 | 33.4 | 74.20 | 105.0 |
| 6.05 | 30.4 | 17.69 | 35.62 | 119.20 | 169.5 |

POTASSIUM FORMATE HCOOK.**SOLUBILITY OF POTASSIUM FORMATE AND OF THE ACID SALT
IN WATER.**

(Groschuff — Ber. 36, 1785, 1903.)

| Solid Phase : HCOOK | | | Solid Phase : HCOOK. HCOOH. | | | | | |
|---------------------|---|---|-----------------------------|---|---|------|---|---|
| t°. | Gms. HCOOK per 100 Gms. Solution. | Mols. HCOOK per 100 Mols. H ₂ O. | t°. | Gms. HCOOK HCOOH per 100 Gms. Solution. | Gms. HCOOK per 100 Gms. Solution. | t°. | Gms. HCOOK per 100 Gms. Solution. | Mols. HCOOH per 1 Mol. HCOOK. |
| — 20 | 72.8 | 57.4 | 0 | 60.4 | 39.0 | 0 | 36.3 | 3.21 |
| + 18 | 76.8 | 71.0 | 25 | 69.8 | 45.1 | 19.5 | 38.2 | 2.96 |
| 50 | 80.7 | 89.8 | 50 | 79.2 | 51.2 | 39.3 | 40.8 | 2.65 |
| 90 | 86.8 | 141.0 | 80 | 90.7 | 58.6 | 60 | 44.0 | 2.33 |
| 120 | 92.0 | 247.0 | | | | 70 | 45.9 | 2.16 |
| 140 | 96.0 | 511 | | | | 90 | 52.1 | 1.68 |
| 157 | 100.0 | ∞ | | | | | | |

Sp. Gr. of sat. sol. at 18° = 1.573.

NOTE. — Since the acid salt is less soluble at ordinary temperatures than the neutral salt, it can be precipitated from the solution of the neutral salt by addition of aqueous formic acid. Proceeding in this way an impure product is obtained, giving solubility values (expressed in HCOOK) as shown in the last three columns above.

POTASSIUM FLUOGERMANATE K₂GeF₆.**SOLUBILITY IN WATER.**

(Winkler; Kruss and Nilson — Ber. 20, 1696, '87.)

100 gms. H₂O dissolve 173.98 gms. K₂GeF₆ at 18°, and 34.07 gms. at 100° (W.).

100 gms. H₂O dissolve 184.61 gms. K₂GeF₆ at 18°, and 38.76 gms. at 100° (K. and N.).

POTASSIUM HYDROXIDE KOH.**SOLUBILITY IN WATER.**

(Pickering — J. Ch. Soc. 63, 908, '93; at 15°, Ferchland — Z. anorg. Ch. 30, 133, '02.)

| t°. | Gms. KOH per 100 Gms. | | Solid Phase. | t°. | Gms. KOH per 100 Gms. | | Solid Phase. |
|--------|--------------------------|-----------|---|------|--------------------------|-----------|---|
| | Water. | Solution. | | | Water. | Solution. | |
| — 22 | 3.7 | 3.6 | Ice | 15 | 107 | 51.7 | KOH.2H ₂ O |
| — 20.7 | 22.5 | 18.4 | " | 20 | 112 | 52.8 | " |
| — 65.2 | 44.5 | 30.8 | " | 30 | 126 | 55.76 | " |
| — 36.2 | 36.2 | 26.6 | KOH.4H ₂ O | 32.5 | 135 | 57.44 | KOH.2H ₂ O + KOH.H ₂ O |
| — 32.7 | 77.94 | 43.8 | " | 50 | 140 | 58.33 | KOH.H ₂ O |
| — 33 | 80 | 44.4 | KOH.4H ₂ O + KOH.2H ₂ O | 100 | 178 | 64.03 | " |
| — 23.2 | 85 | 45.9 | KOH.2H ₂ O | 125 | 213 | 68.06 | " |
| 0 | 97 | 49.2 | " | 143 | 311.7 | 75.73 | " |
| 10 | 103 | 50.7 | " | | | | |

Sp. Gr. of sat. solution at 15° = 1.5355.

POTASSIUM IODATE

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POTASSIUM IODATE KIO_3 .

SOLUBILITY IN WATER.

(Kremers — Pogg. Ann. 97, '5, '56; at 30°, Meerburg — Ch. Weekbl. I, 474, '04.)

| t° | 0° | 20° | 30° | 40° | 60° | 80° | 100° |
|-------------------------------------|------|------|-------|------|------|------|------|
| Gms. KIO_3 per 100 gms. H_2O | 4.73 | 8.13 | 11.73 | 12.8 | 18.5 | 24.8 | 32.2 |

100 gms. H_2O dissolve 1.3 gms. potassium hydrogen iodate ($KH(IO_3)_2$) at 15°, and 5.4 gms. at 17°.

(Serullas — Ann. chim. phys. 22, 118.)

100 gms. H_2O dissolve 4.0 gms. potassium di hydrogen iodate $KH_2(IO_3)_2$ at 15°.

(Meineke — Liebigs Ann. 261, 360, '91.)

POTASSIUM IODIDE KI.

SOLUBILITY IN WATER.

(Mulder; de Coppet — Ann. chim. phys. [5] 30, 417, '83; Etard — *Ibid.* [7] 2, 526, '94; Meusser — Z. anorg. Ch. 44, 80, '05; see also Tilden and Shenstone — Phil. Trans. 23, '84; Schreinemaker — Z. physik. Chem. 9, 71, '92.)

| t°. | Gms. KI per 100 Gms. | | t°. | Gms. KI per 100 Gms. | |
|------|----------------------|-----------|-----------|----------------------|-----------|
| | Water. | Solution. | | Water. | Solution. |
| — 10 | 115.1 | 53.5 | 80 | 192 | 65.8 |
| — 5 | 119.8 | 54.5 | 90 | 200 | 66.7 |
| — 1 | 122.2 | 55.0 | 100 | 208 | 67.5 |
| 0 | 127.5 | 56.0 | 110 | 215 | 68.3 |
| 10 | 136 | 57.6 | 120 | 223 | 69.0 |
| 20 | 144 | 59.0 | Ice Curve | | |
| 25 | 148 | 59.7 | | | |
| 30 | 152 | 60.3 | | | |
| 40 | 160 | 61.5 | | | |
| 50 | 168 | 62.7 | | | |
| 60 | 176 | 63.7 | | | |
| 70 | 184 | 64.8 | | | |
| | | | — 5 | 25.7 | 22.5 |
| | | | — 7 | 42.6 | 29.9 |
| | | | — 9.5 | 51.5 | 34.0 |
| | | | — 11.5 | 64.7 | 39.3 |
| | | | — 14 | 75.8 | 42.7 |

SOLUBILITY OF POTASSIUM IODIDE IN ABSOLUTE ALCOHOLS.

(de Bruyn — Z. physik. Ch. 10, 783, '92; Rohland — Z. anorg. Ch. 18, 327, '98.)

100 gms. methyl alcohol dissolve 16.5 gms. KI at 20.5°.

100 gms. ethyl alcohol dissolve 1.75 gms. KI at 20.5°.

100 gms. propyl alcohol dissolve 0.46 gm. KI at 15°–20° (R.).

SOLUBILITY OF POTASSIUM IODIDE IN:

Ethyl Alcohol

Aqueous Ethyl Alcohol at 18°.

of 0.946 Sp. Gr.

| t°. | Gms. KI per 100 Gms. Alcohol | Sp. Gr. of Alcohol. | Weight per cent Alcohol. | Gms. KI per 100 Gms. Alcohol. | Sp. Gr. of Alcohol. | Weight per cent Alcohol. | Gms. KI per 100 Gms Alcohol. |
|-----|------------------------------------|---------------------------|--------------------------------|-------------------------------------|---------------------------|--------------------------------|------------------------------------|
| 8 | 67.4 | 0.9904 | 5.2 | 130.5 | 0.9390 | 45 | 66.4 |
| 13 | 69.2 | 0.9851 | 9.8 | 119.4 | 0.9088 | 59 | 48.2 |
| 25 | 75.1 | 0.9726 | 23.0 | 100.1 | 0.8464 | 86 | 11.4 |
| 46 | 84.7 | 0.9665 | 29.0 | 89.9 | 0.8322 | 91 | 6.2 |
| 55 | 87.5 | 0.9528 | 38.0 | 76.9 | | | |
| 62 | 90.2 | | | | | | |

(Gerardin — Ann. chim. phys. [4] 5, 155, '65.)

SOLUBILITY OF POTASSIUM IODIDE IN ACETONE AND IN PYRIDINE.

(von Laszcynski — Ber. 27, 2285, '94; at 25°, Krug and McElroy — J. Anal. Ch. 6, 184, '92.)

| Solvent. | Gms. KI per 100 Gms. Solvent at: | | | | | |
|----------|----------------------------------|------|------|------|------|-------|
| | -2.5°. | 10°. | 22°. | 25°. | 56°. | 119°. |
| Acetone | 3.08 | ... | 2.38 | 2.93 | 1.21 | ... |
| Pyridine | ... | 0.26 | ... | ... | ... | 0.11 |

100 gms. glycerine dissolve 40 gms. KI at 15.5°.

SOLUBILITY OF POTASSIUM IODIDE IN SEVERAL SOLVENTS.

(Walden — Z. physik. Ch. 55, 714, '06.)

| Solvent. | Formula. | t°. | Sp. Gr. of Solution. | Gms. KI per 100 | |
|---------------------|--|-----|----------------------|-----------------|----------------|
| | | | | cc. Solution. | Gms. Solution. |
| Water | H ₂ O | 0 | 1.6699 | 94.05 | 56.32 |
| Water | H ₂ O | 25 | 1.7254 | 102.70 | 59.54 |
| Methyl Alcohol | CH ₃ OH | 0 | 0.8964 | 11.61 | 12.95 |
| Methyl Alcohol | CH ₃ OH | 25 | 0.9003 | 13.5-14.3 | 14.97 |
| Ethyl Alcohol | C ₂ H ₅ OH | 0 | 0.8085 | 1.197 | 1.479 |
| Ethyl Alcohol | C ₂ H ₅ OH | 25 | 0.7908 | 1.520 | 1.922 |
| Glycol | (CH ₂ OH) ₂ | 0 | 1.3954 | 43.28 | 31.03 |
| Glycol | (CH ₂ OH) ₂ | 25 | 1.3888 | 47.23 | 33.01 |
| Acetonitril | CH ₃ CN | 0 | 0.8108 | 1.852 | 2.259 |
| Acetonitril | CH ₃ CN | 25 | 0.7938 | 1.57 | 2.003 |
| Propionitril | C ₂ H ₅ CN | 0 | 0.8005 | 0.34-0.41 | 0.0429 |
| Propionitril | C ₂ H ₅ CN | 25 | 0.7821 | 0.32-0.36 | 0.0404 |
| Benzonitril | C ₆ H ₅ CN | 25 | 1.0076 | 0.051 | 0.0506 |
| Nitro Methane | CH ₃ NO ₂ | 0 | 1.1627 | 0.314-0.366 | 0.315 |
| Nitro Methane | CH ₃ NO ₂ | 25 | 1.1367 | 0.289-0.349 | 0.307 |
| Nitro Benzene | C ₆ H ₅ NO ₂ | 25 | ... | 0.0019 | ... |
| Acetone | (CH ₃) ₂ CO | 0 | 0.8227 | 1.732 | 2.105 |
| Acetone | (CH ₃) ₂ CO | 25 | 0.7968 | 1.038 | 1.302 |
| Furfurol | C ₄ H ₃ O.COH | 0 | ... | 15.10 | ... |
| Furfurol | C ₄ H ₃ O.COH | 25 | 1.2014 | 5.93 | 4.94 |
| Benzaldehyde | C ₆ H ₅ COH | 25 | 1.0446 | 0.343 | 0.328 |
| Salicyl aldehyde | C ₆ H ₄ .OH.COH | 0 | 1.1501 | 1.257 | 1.093 |
| Salicyl aldehyde | C ₆ H ₄ .OH.COH | 25 | 1.1373 | 0.549 | 0.483 |
| Anis aldehyde | C ₆ H ₄ .OCH ₃ .COH | 0 | 1.1223 | 1.520 | 1.355 |
| Anis aldehyde | C ₆ H ₄ .OCH ₃ .COH | 25 | 1.1180 | 0.720 | 0.644 |
| Ethyl Acetate | CH ₃ COOC ₂ H ₅ | 25 | ... | 0.0013 | ... |
| Methyl Cyan Acetate | CH ₃ CNCOOCH ₃ | 0 | 1.1521 | 3.256 | 2.827 |
| Methyl Cyan Acetate | CH ₃ CNCOOCH ₃ | 25 | 1.1358 | 2.459 | 2.165 |
| Ethyl Cyan Acetate | CH ₃ CNCOOC ₂ H ₅ | 25 | 1.0628 | 0.989 | 0.930 |

POTASSIUM NITRITE

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POTASSIUM NITRITE KNO_2 .

100 gms. H_2O dissolve about 300 gms. KNO_2 at 15.5° .

(Divers — J. Ch. Soc. 75, 86, '99.)

POTASSIUM NITRATE KNO_3 .

SOLUBILITY IN WATER.

(Mulder; Andrae — J. pr. Ch. [2] 29, 456, '84; Gerardin — Ann. chim. phys. [4] 5, 150, '65; Etard — *Ibid.* [7] 2, 526, '04; Ost — J. pr. Ch. [2] 17, 233, '78; at 31.25° , Köhler — Z. Ver. Zuckerind. 47, 447, '97; Euler — Z. physik. Ch. 49, 315, '04; Tilden and Shenstone — Phil. Trans. 23, '84; Berkeley — Trans. Roy. Soc. 203 A, 213, '04.)

Average Curve.

| t°. | Gms. KNO_3 per 100 Gms. | | t°. | Gms. KNO_3 per 100 Gms. | |
|-----|----------------------------------|-----------|-----|----------------------------------|-----------|
| | Water. | Solution. | | Water. | Solution. |
| 0 | 13.3 | 11.7 | 70 | 138 | 58.0 |
| 10 | 20.9 | 17.3 | 80 | 169 | 62.8 |
| 20 | 31.6 | 24.0 | 90 | 202 | 66.9 |
| 25 | 37.3 | 27.2 | 100 | 246 | 71.1 |
| 30 | 45.8 | 31.4 | 110 | 300 | 75.0 |
| 40 | 63.9 | 39.0 | 120 | 394 | 79.8 |
| 50 | 85.5 | 44.0 | 125 | 493 | 83.1 |
| 60 | 110.0 | 52.0 | | | |

SOLUBILITY OF MIXTURES OF POTASSIUM NITRATE AND BARIUM NITRATE IN WATER.

(Euler — Z. physik. Ch. 49, 313, '04.)

| t°. | Sp. Gr. of Sat. Solution. | Grams per 100 Grams H_2O . | | |
|------|---------------------------|--|------------------|---------------------------------|
| 17 | 1.120 | 13.26 | KNO_3 + | 6.31 $\text{Ba}(\text{NO}_3)_2$ |
| 21.5 | ... | 17.00 | " + | 7.58 " |
| 30 | 1.191 | 24.04 | " + | 9.99 " |
| 50 | ... | 49.34 | " + | 18.09 " |

SOLUBILITY OF POTASSIUM NITRATE IN AQUEOUS SOLUTIONS OF NITRIC ACID AT 0° .

(Engel — Compt. rend. 104, 913, '87.)

| Sp. Gr. of Solutions. | Equivalents per 10 cc. Solution. | | | Grams per 100 cc. Solution. | | |
|-----------------------|----------------------------------|-------|----------------|-----------------------------|-------|----------------|
| | KNO_3 | | HNO_3 | KNO_3 | | HNO_3 |
| 1.079 | 12.5 | 0 | | 12.65 | 0.00 | |
| ... | 9.9 | 5.87 | " | 10.02 | 3.71 | " |
| 1.093 | 8.28 | 13.2 | " | 8.38 | 8.38 | " |
| 1.117 | 7.4 | 21.55 | " | 7.49 | 13.58 | " |
| 1.144 | 7.4 | 31.1 | " | 7.49 | 19.47 | " |
| 1.202 | 7.6 | 48.0 | " | 7.68 | 30.04 | " |
| 1.289 | 10.3 | 68.0 | " | 10.42 | 42.86 | " |
| 1.498 | 28.3 | 120.5 | " | 28.64 | 75.95 | " |

SOLUBILITY OF POTASSIUM NITRATE AND OF ACID POTASSIUM NITRATES IN NITRIC ACID.

(Groschuff — Ber. 37, 1490, '04.)

NOTE. — Determinations made by the so-called thermometric method, *i.e.*, by observing the temperature of the disappearance of the separated, finely divided solid from solutions of known concentration.

| t °. | Grams per 100 Gms. Solution. | | Solid Phase. | t °. | Gms. per 100 Gms. Solution. | | Solid Phase. |
|--------|------------------------------|--------------------|---|------|-----------------------------|--------------------|------------------------------------|
| | KNO ₃ . | HNO ₃ . | | | KNO ₃ . | HNO ₃ . | |
| — 6 | 24.4 | 75.41 | KNO ₃ .2HNO ₃ (1) | 22.5 | 47.2 | 52.93 | KNO ₃ .HNO ₃ |
| + 14 | 32.6 | 67.42 | " (stabil) | 23.5 | 47.8 | 52.11 | " (stabil) |
| 17 | 34.8 | 65.04 | " | 25.5 | 48.6 | 51.46 | " |
| 19.5 | 37.2 | 62.90 | " | 27.0 | 49.4 | 50.78 | " |
| 22 | 44.5 | 55.46 | " | 29.0 | 50.1 | 49.94 | KNO ₃ .HNO ₃ |
| 21.5 | 47.8 | 52.11 | KNO ₃ .2HNO ₃ (2) | 30.5 | 50.9 | 49.15 | " (labil) |
| 21.5 | 48.6 | 51.46 | " (labil) | 21.0 | 49.4 | 50.78 | KNO ₃ (labil) |
| 20 | 50.9 | 49.15 | " | 39.0 | 50.9 | 49.15 | " (stabil) |
| — 4 | 37.2 | 62.81 | KNO ₃ .HNO ₃ | 50 | 51.7 | 48.32 | " |
| — 16.5 | 44.5 | 55.46 | " (labil) | | | | |

(1) Solution in HNO₃.(2) Solution in KNO₃.

CONDUCT OF ACID POTASSIUM NITRATE TOWARDS WATER.

| t °. | Gms. per 100 Gms. Solution. | | Solid Phase. | t °. | Gms. per 100 Gms. Solution. | | Solid Phase. |
|------|-----------------------------|--------------------|-------------------------------------|------|-----------------------------|--------------------|------------------|
| | KNO ₃ . | HNO ₃ . | | | KNO ₃ . | HNO ₃ . | |
| 22 | 44.5 | 55.5 | KNO ₃ .2HNO ₃ | 50 | 38.7 | 48.3 | KNO ₃ |
| 20.5 | 44.1 | 55.0 | " | 61 | 36.0 | 44.8 | " |
| 18 | 43.8 | 54.5 | " | 63 | 34.5 | 43.0 | " |
| 12 | 43.0 | 53.6 | " | 60.5 | 30.9 | 39.5 | " |
| 6 | 42.3 | 52.7 | " | 56 | 27.6 | 34.4 | " |
| 0 | 41.6 | 51.8 | " | 43 | 20.8 | 25.9 | " |
| 12 | 41.3 | 51.4 | KNO ₃ | 17 | 11.7 | 16.6 | " |
| 22 | 40.9 | 51.0 | " | — 5 | 5.54 | 6.91 | " |
| 40 | 39.9 | 49.8 | " | | | | |

SOLUBILITY OF MIXTURES OF POTASSIUM NITRATE AND POTASSIUM CHLORIDE IN WATER.

(Etard — Ann. chim. phys. [7] 3, 283, '94; at 20°, Rüdorff — Ber. 6, 482, '73; Nicol — Phil. Mag. [5] 31, 385, '91.)

| t °. | Gms. per 100 Gms. Solution. | | t °. | Gms. per 100 Gms. Solution. | | t °. | Gms. per 100 Gms. Solution. | |
|------|-----------------------------|------|------|-----------------------------|------|------|-----------------------------|------|
| | KNO ₃ . | KCl. | | KNO ₃ . | KCl. | | KNO ₃ . | KCl. |
| 0 | 5.0 | 20.0 | 30 | 16.0 | 21.2 | 70 | 39.5 | 17.5 |
| 10 | 8.0 | 20.8 | 40 | 21.0 | 21.0 | 80 | 45.5 | 15.8 |
| 20 | 12.6 | 21.2 | 50 | 27.0 | 20.0 | 100 | 57.5 | 11.6 |
| 25 | 14.0 | 21.3 | 60 | 33.5 | 19.0 | 120 | 69.0 | 7.7 |

SOLUBILITY OF POTASSIUM NITRATE IN AQUEOUS SOLUTIONS OF:
(Touren — Compt. rend. 131, 259, '00.)

Potassium Carbonate.

Potassium Bi Carbonate.

| Results at 14.5°. | | | | Results at 14.5°. | | | |
|----------------------------------|--------------------|----------------------------------|--------------------|---------------------|--------------------|---------------------|--------------------|
| Mols. per Liter. | | Gms. per Liter. | | Mols. per Liter. | | Grams per Liter. | |
| K ₂ CO ₃ . | KNO ₃ . | K ₂ CO ₃ . | KNO ₃ . | KHCO ₃ . | KNO ₃ . | KHCO ₃ . | KNO ₃ . |
| 0.0 | 2.228 | 0.0 | 225 | 0.0 | 2.33 | 0.0 | 236 |
| 0.48 | 1.85 | 66.4 | 188 | 0.39 | 2.17 | 39.0 | 220 |
| 1.25 | 1.39 | 172.9 | 141 | 0.76 | 2.03 | 76.0 | 205 |
| 2.58 | 0.86 | 356.9 | 87 | 1.16 | 1.92 | 116 | 194 |
| 3.94 | 0.64 | 544.9 | 65 | 1.55 | 1.81 | 155 | 183 |
| Results at 25°. | | | | Results at 25°. | | | |
| 0.0 | 3.217 | 0.0 | 326 | 0.0 | 3.28 | 0.0 | 332 |
| 0.59 | 2.62 | 81.6 | 265 | 0.89 | 2.84 | 89 | 287 |
| 1.35 | 1.97 | 186.7 | 199 | 1.33 | 2.65 | 133 | 268 |
| 2.10 | 1.46 | 290.5 | 148 | 1.91 | 2.45 | 191 | 249 |
| 2.70 | 1.14 | 373.6 | 115 | | | | |
| 3.58 | 0.79 | 495.1 | 80 | | | | |

SOLUBILITY OF MIXTURES OF POTASSIUM NITRATE AND POTASSIUM
SULPHATE IN WATER.

(Euler — Z. physik. Ch. 49, 313, '04.)

| t°. | Sp. Gr. of Sat. Solution. | Grams per 100 Grams Water. | |
|-----|---------------------------|----------------------------|-------------------------------------|
| 15 | 1.165 | 24.12 KNO ₃ | 5.65 K ₂ SO ₄ |
| 20 | ... | 30.10 " | 5.58 " |
| 25 | 1.210 | 36.12 " | 5.58 " |

SOLUBILITY OF MIXTURES OF POTASSIUM NITRATE AND SODIUM
CHLORIDE IN WATER.

(Etard — Ann. chim. phys. [7] 3, 283, '94; the older determinations of Rüdorff, Karsten, Mulder, etc., agree well with those of Etard.)

| t°. | Gms. per 100 Gms. Solution. | | t°. | Gms. per 100 Gms. Solution. | | t°. | Gms. per 100 Gms. Solution. | |
|-----|-----------------------------|-------|-----|-----------------------------|-------|-----|-----------------------------|-------|
| | KNO ₃ . | NaCl. | | KNO ₃ . | NaCl. | | KNO ₃ . | NaCl. |
| 0 | 13 | 24 | 40 | 30.5 | 19 | 120 | 73 | 8.0 |
| 10 | 16 | 23 | 50 | 36 | 17 | 140 | 77 | 7.0 |
| 20 | 20 | 22 | 60 | 42.5 | 15 | 160 | 79.5 | 6.0 |
| 25 | 23 | 21.5 | 80 | 55 | 12 | 170 | 80.5 | 5.5 |
| 30 | 25 | 20.5 | 100 | 67 | 9.5 | | | |

SOLUBILITY OF POTASSIUM NITRATE IN AQUEOUS SOLUTIONS OF SODIUM
NITRATE AND VICE VERSA AT 20°.

(Carnelly and Thomson — J. Ch. Soc. 53, 782, '88; Nicol — Phil. Mag. 31, 369, '91.)

KNO₃ in Aq. NaNO₃ Solutions.

NaNO₃ in Aq. KNO₃ Solutions.

| Grams per 100 Grams H ₂ O. | | Grams per 100 Grams H ₂ O. | |
|---------------------------------------|------------------|---------------------------------------|---------------------|
| NaNO ₃ . | KNO ₃ | KNO ₃ . | NaNO ₃ . |
| 0 | 31.6 | 0 | 88 |
| 10 | 30.5 | 10 | 90 |
| 20 | 31.0 | 20 | 92 |
| 40 | 33.0 | 25 | 93 |
| 60 | 35.5 | 30 | 94 |
| 80 | 41.0 | 35 | 96 |

SOLUBILITY OF MIXTURES OF POTASSIUM NITRATE AND SILVER NITRATE IN WATER.

(Etard — Ann. chim. phys. [7] 3, 283, '94.)

| t°. | Gms. per 100 Gms. Sol. | | t°. | Gms. per 100 Gms. Sol. | | t°. | Gms. per 100 Gms. Sol. | |
|-----|------------------------|---------------------|-----|------------------------|---------------------|-----|------------------------|---------------------|
| | KNO ₃ . | AgNO ₃ . | | KNO ₃ . | AgNO ₃ . | | KNO ₃ . | AgNO ₃ . |
| 0 | 13.5 | 43.0 | 30 | 26.8 | 49.4 | 80 | 36.2 | 55.1 |
| 10 | 19.0 | 44.7 | 40 | 29.6 | 51.5 | 100 | 38.3 | 55.3 |
| 20 | 23.0 | 47.0 | 50 | 32.0 | 54.0 | 120 | 40.0 | 55.6 |
| 25 | 25.0 | 48.0 | 60 | 33.5 | 54.8 | 140 | 41.5 | 55.8 |

SOLUBILITY OF MIXED CRYSTALS OF POTASSIUM NITRATE AND SILVER NITRATE IN WATER AT 25°.

(Herz — Inaug. Diss. (Berlin) '05; Calc. by Fock — Z. Kryst. Min. 28, 405, '97.)

| Grams per Liter. | | Mg. Mols. per Liter. | | Mol. per cent AgNO ₃ in Solution. | Mol. per cent AgNO ₃ in Solid Phase. |
|---------------------|--------------------|----------------------|--------------------|--|---|
| AgNO ₃ . | KNO ₃ . | AgNO ₃ . | KNO ₃ . | | |
| 45.9 | 321.8 | 270 | 3180 | 7.83 | 0.2896 |
| 110.7 | 322.6 | 651.3 | 3184 | 16.06 | 0.6006 |
| 176.8 | 333.7 | 1040 | 3298 | 23.97 | 0.9040 |
| 259.6 | 364.0 | 1528 | 3597 | 29.81 | 1.054 |
| 365.6 | 456.4 | 2151 | 4511 | 32.28 | 1.604 |
| 507.9 | 387.2 | 2988 | 3816 | 43.85 | 2.439 |
| 745.9 | 398.6 | 4388 | 3960 | 52.70 | 8.294 |

SOLUBILITY OF MIXED CRYSTALS OF POTASSIUM NITRATE AND THALLIUM NITRATE IN WATER AT 25°.

(Fock.)

| Grams per Liter. | | Mg. Mols. per Liter. | | Mol. per cent TlNO ₃ in Solution. | Sp. Gr. of Solutions. | Mol. per cent TlNO ₃ in Solid Phase. |
|---------------------|--------------------|----------------------|--------------------|--|-----------------------------|---|
| TlNO ₃ . | KNO ₃ . | TlNO ₃ . | KNO ₃ . | | | |
| 0.00 | 351.0 | 0.0 | 3468.2 | 0.00 | 1.2632 | 0.00 |
| 2.37 | 329.0 | 8.9 | 3251.5 | 0.43 | 1.1903 | 0.03 |
| 6.15 | 332.4 | 23.1 | 3285.1 | 0.70 | 1.1956 | 0.20 |
| 17.64 | 333.7 | 66.3 | 3298.1 | 1.97 | 1.2050 | 0.57 |
| 49.74 | 333.3 | 186.9 | 3294.4 | 5.37 | 1.2196 | 1.78 |
| 63.60 | 321.0 | 239.0 | 3172.4 | 7.01 | 1.2436 | 2.19 |
| 86.18 | 330.5 | 323.8 | 3265.8 | 9.02 | 1.2617 | 2.77 |
| 123.8 | 428.3 | 465.2 | 4232.6 | 9.90 | 1.2950 | 6.00 27.04 |
| 101.3 | 245.1 | 380.6 | 2423.3 | 13.58 | 1.2050 | 93.33 |
| 116.1 | 0.0 | 463.1 | 0.0 | 100.00 | 1.0964 | 100.00 |

SOLUBILITY OF POTASSIUM NITRATE IN AQUEOUS ALCOHOL SOLUTIONS.

(Gerardin — Ann. chim. phys. [4] 5, 151, '65.)

Grams KNO₃ per 100 Grams Aqueous Alcohol of Sp. Gr.:

| t°. | 0.9904 = 5.5 Wt. %. | 0.9843 = 9.5 Wt. %. | 0.9793 = 13.5 Wt. %. | 0.9726 = 19.1 Wt. %. | 0.9571 = 30 Wt. %. | 0.939 = 40 Wt. %. | 0.907 = 60 Wt. %. | 0.8429 = 80 Wt. %. |
|-----|---------------------------|---------------------------|----------------------------|----------------------------|--------------------------|-------------------------|-------------------------|--------------------------|
| 10 | 17 | 13 | 10 | 7 | 4.5 | 3 | 1 | 0.2 |
| 18 | 22.5 | 18.5 | 14.5 | 10 | 6.2 | 4.5 | 1.6 | 0.3 |
| 20 | 24 | 20 | 16 | 11 | 7.0 | 5 | 2 | 0.3 |
| 25 | 29 | 24.5 | 20 | 13.5 | 9.0 | 6.5 | 2.5 | 0.4 |
| 30 | 36 | 30 | 25 | 17 | 11.5 | 8 | 3.0 | 0.5 |
| 40 | 52 | 43 | 36 | 27 | 16.5 | 11 | 4 | 0.6 |
| 50 | 72 | 61 | 50 | 38 | 23.0 | 16 | 6 | 0.7 |
| 60 | 93 | 79 | 69 | 52 | 31.0 | 21 | 8 | 1.1 |

SOLUBILITY OF POTASSIUM NITRATE IN AQUEOUS ALCOHOL AT 18°.
(Bodländer — Z. physik. Ch. 7, 316, '91.)

| Sp. Gr. of Solution. | Gms. per 100 cc. Solution. | | | Sp. Gr. of Solution. | Gms. per 100 cc. Solution. | | |
|----------------------|-----------------------------------|-------------------|--------------------|----------------------|-----------------------------------|-------------------|--------------------|
| | C ₂ H ₅ OH. | H ₂ O. | KNO ₃ . | | C ₂ H ₅ OH. | H ₂ O. | KNO ₃ . |
| 1.1480 | ... | 89.80 | 25.0 | 1.0120 | 23.33 | 69.81 | 8.06 |
| 1.1085 | 3.30 | 87.44 | 20.11 | 0.9935 | 28.11 | 64.74 | 6.50 |
| 1.1010 | 5.24 | 86.26 | 18.60 | 0.9585 | 37.53 | 54.21 | 4.11 |
| 1.0805 | 8.69 | 83.18 | 16.18 | 0.9450 | 42.98 | 48.15 | 3.37 |
| 1.0755 | 9.06 | 83.10 | 15.39 | 0.9050 | 51.23 | 27.32 | 1.95 |
| 1.0655 | 14.08 | 77.93 | 14.54 | 0.8722 | 61.65 | 24.74 | 0.83 |
| 1.0490 | 16.27 | 76.36 | 12.27 | 0.8375 | 69.60 | 13.95 | 0.20 |
| 1.0375 | 19.97 | 72.93 | 10.85 | | | | |

SOLUBILITY OF POTASSIUM NITRATE IN AQUEOUS ALCOHOL AND IN AQUEOUS ACETONE.
(Bathrick — J. Physic. Ch. 1, 160, '96.)

In Aqueous Alcohol.

In Aqueous Acetone at 40°.

| Wt. per cent Alcohol. | Gms. KNO ₃ per 100 Gms. Aq. Alcohol. | | Wt. per cent Acetone. | Gms. KNO ₃ per 100 Gms. Solvent. |
|-----------------------|---|-------------|-----------------------|---|
| | At 30°. | At 40°. | | |
| 0 | 45.6 | 64.5 | 0 | 64.5 |
| 8.25 | 32.3 | 47.1 | 8.5 | 51.3 |
| 17.0 | 22.4 | 33.3 | 16.8 | 38.9 |
| 25.7 | 15.1 | 24.1 | 25.2 | 22.8 |
| 35.0 | 11.4 (34.4°) | 16.7 | 34.3 | 24.7 |
| 44.9 | 7.0 | 11.6 (44°) | 44.1 | 17.0 |
| 54.3 | 4.5 | 7.2 (55°) | 53.9 | 11.9 |
| 65.0 | 2.7 | 4.4 | 64.8 | 7.2 |
| 75.6 | 1.3 | 2.0 (76.3°) | 76.0 | 3.0 |
| 88.0 | 0.4 | 0.6 (88.5°) | 87.6 | 0.7 |

100 grams H₂O saturated with sugar and KNO₃ dissolve 224.7 gms. sugar + 41.9 gms. KNO₃, or 100 gms. of the saturated solution contain 61.36 gms. sugar + 11.45 gms. KNO₃ at 31.25°.

(Köhler — Z. Ver Zuckerind. 47, 447, '97.)

POTASSIUM OXALATE K₂C₂O₄·4H₂O.

SOLUBILITY OF MIXTURES OF POTASSIUM OXALATE AND OXALIC ACID IN WATER AT 25°.

(Foote and Andrew — Am. Ch. J. 34, 155, '05.)

| Gms. per 100 Gms. Solution. | | Mols. per 100 Mols. H ₂ O. | | Solid Phase. |
|--|--|--|--|---|
| H ₂ C ₂ O ₄ . | K ₂ C ₂ O ₄ . | H ₂ C ₂ O ₄ . | K ₂ C ₂ O ₄ . | |
| 10.2 | ... | 2.274 | ... | H ₂ C ₂ O ₄ ·2H ₂ O |
| 10.31 | 0.04 | 2.302 | 0.005 | H ₂ C ₂ O ₄ ·2H ₂ O + H ₂ K(C ₂ O ₄) ₂ ·2H ₂ O |
| 9.26 | 0.13 | 2.046 | 0.016 | } Double salt H ₂ K(C ₂ O ₄) ₂ ·2H ₂ O |
| 3.39 | 0.63 | 0.707 | 0.071 | |
| 2.06 | 4.26 | 0.440 | 0.495 | H ₂ K(C ₂ O ₄) ₂ ·2H ₂ O + HKC ₂ O ₄ |
| 1.16 | 11.50 | 0.266 | 1.427 | } Double salt HKC ₂ O ₄ |
| 0.99 | 16.93 | 0.240 | 2.235 | |
| 0.85 | 21.08 | 0.221 | 2.928 | HKC ₂ O ₄ + H ₂ K ₄ (C ₂ O ₄) ₃ ·2H ₂ O |
| 0.82 | 21.49 | 0.211 | 2.998 | } Double salt H ₂ K ₄ (C ₂ O ₄) ₃ ·2H ₂ O |
| 0.64 | 23.52 | 0.169 | 3.361 | |
| 0.57 | 24.88 | 0.153 | 3.617 | |
| 0.43 | 27.52 | 0.122 | 4.14 | H ₂ K ₄ (C ₂ O ₄) ₃ ·2H ₂ O + K ₂ C ₂ O ₄ ·H ₂ O |
| ... | 27.40 | ... | 4.09 | K ₂ C ₂ O ₄ ·H ₂ O |

SOLUBILITY OF POTASSIUM OXALATE AND ACID POTASSIUM OXALATE IN WATER.

(Alluard; results at 0°, Engel — Ann. chim. phys. [6] 13, 362, '88.)

100 gms. H₂O dissolve 25.24 gms. K₂C₂O₄, or 100 gms. of sat. solution contain 20.62 gms. K₂C₂O₄ at 0°. Sp. Gr. of solution = 1.161.

| Acid Oxalate in Solutions of Neutral Oxalate at 0°. | | | | | Acid Oxalate in Water. | |
|--|--|-----------------------|--|--|------------------------|---|
| g H ₂ SO ₄ Corresponding to K in 10 cc. Sol. | g KOH Corresponding to Free Acid in 10 cc. | Sp. Gr. of Solutions. | Gms. per 100 cc. Sol. | | t °. | Gms. KHC ₂ O ₄ per 100 Gms. H ₂ O. |
| | | | K ₂ C ₂ O ₄ . | H ₂ C ₂ O ₄ . | | |
| 28.5 | 0.4 | 1.164 | 23.53 | 0.18 | 0 | 2.2 |
| 10.8 | 0.925 | ... | 8.91 | 0.41 | 10 | 3.1 |
| 6.8 | 1.075 | 1.042 | 5.61 | 0.48 | 20 | 5.2 |
| 4.78 | 1.25 | 1.031 | 3.94 | 0.56 | 40 | 10.5 |
| 3.83 | 1.45 | 1.025 | 3.16 | 0.65 | 60 | 20.5 |
| 3.35 | 1.53 | 1.022 | 2.76 | 0.68 | 80 | 34.7 |
| 2.6 (1) | 1.85 | 1.018 | 2.15 | 0.83 | 100 | 51.5 |
| 2.0 (2) | 2.25 | 1.007 | 1.65 | 1.00 | | |
| 0.45 (3) | 1.25 | 1.004 | 0.37 | 0.56 | | |

(1) Sat. with acid potassium oxalate. (2) Sat. with both acid oxalate and tetroxalate.

(3) Sat. with tetroxalate.

POTASSIUM PERMANGANATE KMnO₄.

SOLUBILITY IN WATER.

(Baxter, Boylston, and Hubbard — J. Am. Ch. Soc. 28, 1348, '06; Patterson — *Ibid.* 28, 1735, '06.)

| t °. | Grams KMnO ₄ per 100 : | | | t °. | Grams KMnO ₄ per 100 : | |
|------|-----------------------------------|------------------------|-------------------|------|-----------------------------------|------------------------|
| | Gms. Solution. | Gms. H ₂ O. | cc. Solution (P). | | Gms. Solution. | Gms. H ₂ O. |
| 0 | 2.75 | 2.83 | 2.84 | 34.8 | 9.64 | 10.67 |
| 9.8 | 4.13 | 4.31 | ... | 40 | 11.16 | 12.56 |
| 15.0 | ... | ... | 5.22 | 45 | 12.73 | 14.58 |
| 19.8 | 5.96 | 6.34 | ... | 50 | 14.45 | 16.89 |
| 24.8 | 7.06 | 7.59 | ... | 55 | 16.20 | 19.33 |
| 29.8 | 8.28 | 9.03 | 8.69 | 65 | 20.02 | 25.03 |

Sp. Gr. of saturated solution at 15° = 1.035.

SOLUBILITY OF POTASSIUM PERMANGANATE IN:

Water.

(Voerman — Chem. Centr. 77, I, 125, '06.)

Aqueous Acetone Solutions at 13°.

(Herz and Knoch — Z. anorg. Ch. 41, 317 '04.)

| t °. | Gms. KMnO ₄ per 100 Gms. | | Solid Phase. | cc. Acetone per 100 cc. Solvent. | KMnO ₄ per 100 cc. Solution. | |
|--------|-------------------------------------|--------|-------------------------|----------------------------------|---|--------|
| | Solution. | Water. | | | Millimols. | Grams. |
| — 0.18 | 0.58 | 0.58 | Ice | 0 | 148.5 | 4.70 |
| — 0.27 | 0.99 | 1.01 | " | 10 | 162.2 | 5.13 |
| — 0.48 | 1.98 | 2.02 | " | 20 | 177.3 | 5.61 |
| — 0.58 | 2.91 | 3.00 | Ice + KMnO ₄ | 30 | 208.2 | 6.59 |
| + 10.0 | 4.01 | 4.22 | KMnO ₄ | 40 | 257.4 | 8.14 |
| 15 | 4.95 | 5.20 | " | 50 | 289.7 | 9.16 |
| 25 | 7.00 | 7.53 | " | 60 | 316.8 | 10.02 |
| 40 | 10.40 | 11.61 | " | 70 | 328.0 | 10.38 |
| 50 | 14.35 | 16.75 | " | 80 | 312.5 | 9.89 |
| | | | | 90 | 227.0 | 7.18 |
| | | | | 100 | 67.0 | 2.14 |

POTASSIUM PERMAN- GANATE

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SOLUBILITY OF MIXED CRYSTALS OF POTASSIUM PERMANGANATE AND POTASSIUM PERCHLORATE AT 7°.

(Muthmann and Kuntze — Z. Kryst. Min. 23, 368, '94; recalculated by Fock — *Ibid.* 28, 402, '97.)

| Milligram Mols. per Liter. | | Grams per Liter. | | Mol. per cent KMnO ₄ in Crystals of Solid Phase. |
|----------------------------|---------------------|---------------------|---------------------|--|
| KMnO ₄ . | KClO ₃ . | KMnO ₄ . | KClO ₄ . | |
| 0.0 | 63.91 | 0.00 | 8.86 | 0.00 |
| 29.37 | 54.48 | 4.65 | 7.55 | 2.84 |
| 67.73 | 42.75 | 10.71 | 5.93 | 9.78 |
| 79.04 | 39.59 | 12.50 | 5.49 | 10.81 |
| 99.81 | 38.63 | 15.79 | 5.36 | 15.96 |
| 122.24 | 34.39 | 19.34 | 4.77 | 23.56 |
| 119.21 | 38.91 | 18.84 | 5.39 | 24.28 |
| 128.08 | 33.77 | 20.26 | 4.68 | 26.40 |
| 144.46 | 33.14 | 22.86 | 4.59 | 34.32 |
| 167.81 | 29.53 | 26.55 | 4.09 | 44.42 |
| 183.09 | 25.19 | 28.97 | 3.49 | 67.33 |
| 197.82 | 20.16 | 31.30 | 2.80 | 77.95 |
| 233.75 | 28.26 | 36.98 | 3.92 | 94.37 |
| 264.27 | 0.00 | 41.81 | 0.00 | 100.00 |

SOLUBILITY OF MIXED CRYSTALS OF POTASSIUM PERMANGANATE AND RUBIDIUM PERMANGANATE AT 7°.

(Muthmann and Kuntze, calc. by Fock.)

| Milligram Mols. per Liter. | | Grams per Liter. | | Mol. per cent KMnO ₄ in Crystals of Solid Phase. |
|----------------------------|----------------------|---------------------|----------------------|--|
| KMnO ₄ . | RbMnO ₄ . | KMnO ₄ . | RbMnO ₄ . | |
| 27.04 | 22.69 | 4.28 | 4.64 | 3.50 |
| 75.00 | 22.22 | 11.84 | 4.54 | 13.75 |
| 120.26 | 31.29 | 19.03 | 6.40 | 34.29 |
| 188.30 | 38.98 | 29.80 | 7.97 | 71.45 |
| 198.36 | 41.29 | 31.39 | 8.44 | 92.50 |
| 205.76 | 42.50 | 32.56 | 8.69 | 99.47 |
| 225.12 | 26.00 | 35.61 | 5.32 | 99.32 |
| 264.27 | 0.00 | 41.81 | 0.00 | 100.00 |

POTASSIUM PHOSPHATE KH₂PO₄ (Monobasic).

One liter aqueous solution contains 249.9 grams at 7°.

(Muthmann and Kuntze.)

POTASSIUM HYPOPHOSPHATE, etc.

SOLUBILITY IN WATER.

(Salzer — Liebig's Ann. 211, 1, 82.)

| Salt. | Formula. | Gms. Salt per 100 Gms. H ₂ O. | |
|--------------------------------|--|---|------|
| | | Cold. | Hot. |
| Potassium Hypophosphate | K ₄ P ₂ O ₆ ·8H ₂ O | 400 | ... |
| " Hydrogen Hypophosphate | K ₂ HP ₂ O ₆ ·3H ₂ O | 200 | ... |
| " Di Hydrogen Hypophosphate | K ₂ H ₂ P ₂ O ₆ ·3H ₂ O | 33 | 100 |
| " Tri Hydrogen Hypophosphate | KH ₂ P ₂ O ₆ | 66.6 | 200 |
| " Penta Hydrogen Hypophosphate | K ₃ H ₅ (P ₂ O ₆) ₂ ·2H ₂ O | 40 | 125 |
| " Hydrogen Phosphite | KH ₂ PO ₃ | 172 (20°) | ... |
| " Hypophosphite | KH ₂ PO ₂ | 200 (25°) | 333 |
| " Hypophosphite | KH ₂ PO ₂ * | 14.3 (25°) | 28 |

* Solvent alcohol.

**POTASSIUM PHOSPHO-
MOLYBDATE**

POTASSIUM PHOSPHOMOLYBDATE $K_2PO_4 \cdot 11MoO_3 \cdot 1\frac{1}{2}H_2O$.

100 gms. H_2O dissolve 0.007 gms. at 30° .

100 gms. aqueous 10 % HNO_3 dissolve 0.204 gms. at 30° .

(Donk — Proc. Assoc. Official Agri. Chemists — Bull. No. 90, Bureau of Chemistry,
U. S. Dept. of Agr., '05.)

POTASSIUM SELINATE K_2SeO_4 .

SOLUBILITY IN WATER.

| t° . | -20° . | -5° . | $+5^\circ$. | 18° . | 97° . |
|---------------------------------------|---------------|--------------|--------------|--------------|--------------|
| Gms. K_2SeO_4 per 100 gms. solution | 51.5 | 51.7 | 52.0 | 52.6 | 54.9 |

(Etard — Ann. Chim. phys. [7] 2, 550, '94.)

POTASSIUM STANNATE $K_2SnO_3 \cdot 3H_2O$.

100 gms. H_2O dissolve 106.6 gms. at 10° , and 110.5 gms. at 20° .
Sp. Gr. at $10^\circ = 1.618$ at $20^\circ = 1.627$.

(Ordway — Am. J. Sci. [2] 40, 173, '65.)

POTASSIUM SULPHATE K_2SO_4 .

SOLUBILITY IN WATER.

(Mulder; Andrae — J. pr. Ch. 29, 456, '84; Trevor — Z. physik. Ch. 7, 468, 91; Tilden and Shenstone — Phil. Trans. 31, '84; Berkeley — Trans. Roy. Soc. 203 A, 209, '04; see also Etard — Ann. chim. phys. [7] 2, 549, '94.)

| t° . | Gms. K_2SO_4 per 100 Gms. | | t° . | Gms. K_2SO_4 per 100 Gms. | | t° . | Gms. K_2SO_4 per 100 Gms. | |
|-------------|-----------------------------|-----------|-------------|-----------------------------|-----------|-------------|-----------------------------|-----------|
| | Water. | Solution. | | Water. | Solution. | | Water. | Solution. |
| 0 | 7.35 | 6.85 | 40 | 14.76 | 12.86 | 90 | 22.8 | 18.57 |
| 10 | 9.22 | 8.44 | 50 | 16.50 | 14.16 | 100 | 24.1 | 19.42 |
| 20 | 11.11 | 10.00 | 60 | 18.17 | 15.38 | 120 | 26.5 | 20.94 |
| 25 | 12.04 | 10.75 | 70 | 19.75 | 16.49 | 143 | 28.8 | 22.36 |
| 30 | 12.97 | 11.48 | 80 | 21.4 | 17.63 | 170 | 32.9 | 24.76 |

Sp. Gr. of solution saturated at $18^\circ = 1.083$.

SOLUBILITY OF POTASSIUM SULPHATE IN AQUEOUS AMMONIA
SOLUTIONS AT 20° .

(Girard — Bull. soc. chim. [2] 43, 552, '85.)

| | | | | | |
|-------------------------------------|-------|-------|-------|-------|-------|
| Gms. NH_3 per 100 cc. solution | 0 | 6.086 | 15.37 | 24.69 | 31.02 |
| Gms. K_2SO_4 per 100 cc. solution | 10.80 | 4.10 | 0.83 | 0.14 | 0.04 |

SOLUBILITY OF MIXED CRYSTALS OF POTASSIUM SULPHATE AND
AMMONIUM SULPHATE AT 25° .

(Fock — Z. Kryst. Min. 28, 375, '97.)

| Grams per Liter. | | Milligram Mols. per Liter. | | Mol. per cent K_2SO_4 in Solution. | Sp. Gr. of Solution. | Mol. per cent K_2SO_4 in Solid Phase. |
|------------------|------------------|----------------------------|------------------|--|----------------------------|---|
| K_2SO_4 . | $(NH_4)_2SO_4$. | K_2SO_4 . | $(NH_4)_2SO_4$. | | | |
| 127.9 | 0.0 | 734 | 0.0 | 100 | 1.086 | 100 |
| 135.7 | 115.7 | 778.5 | 874.6 | 47.1 | 1.149 | 91.28 |
| 84.20 | 281.1 | 483 | 2126 | 18.5 | 1.200 | 80.05 |
| 59.28 | 355.0 | 340 | 2685 | 11.13 | 1.226 | 68.63 |
| 40.27 | 482.7 | 231 | 3650 | 5.98 | 1.246 | 27.53 |
| 0.00 | 542.3 | 0.0 | 4100 | 0.00 | 1.245 | 0.00 |

Results are also given for 14° , 15° , 16° , 30° , 46° , and 47° .

SOLUBILITY OF MIXED CRYSTALS OF POTASSIUM COPPER SULPHATE AND AMMONIUM COPPER SULPHATE IN WATER.

$\text{CuSO}_4 \cdot \text{K}_2\text{SO}_4 \cdot 6\text{H}_2\text{O}$ and $\text{CuSO}_4(\text{NH}_4)_2\text{SO}_4 \cdot 6\text{H}_2\text{O}$ at 13° – 14° .

(Fock.)

| Mols. per 100 Mols. H_2O | | Mol. per cent K Salt | | Mols. per 100 Mols. H_2O | | Mol. per cent K Salt | |
|--|---------------------|----------------------|-----------|--|---------------------|----------------------|-----------|
| K. Salt. | NH_4 Salt. | in Solution. | in Solid. | K Salt. | NH_4 Salt. | in Solution. | in Solid. |
| 0.00 | 1.035 | 0.00 | 0.00 | 0.2946 | 0.5096 | 36.63 | 58.20 |
| 0.0897 | 0.8618 | 5.06 | 10.34 | 0.3339 | 0.3319 | 50.15 | 75.34 |
| 0.2269 | 0.6490 | 16.76 | 33.05 | 0.4560 | 0.1961 | 69.93 | 83.86 |
| 0.2570 | 0.5887 | 30.40 | 46.22 | 0.4374 | 0.00 | 100.00 | 100.00 |

SOLUBILITY OF SOME POTASSIUM DOUBLE SULPHATES IN WATER AT 25° .

(Locke — Am. Ch. J. 27, 459, '01.)

| Double Salt. | Formula. | Gms. Anhydrous Salt per 100 Gms. H_2O . |
|---------------------------|--|---|
| Potassium Cobalt Sulphate | $\text{K}_2\text{CO}(\text{SO}_4)_2 \cdot 6\text{H}_2\text{O}$ | 12.88 |
| " Copper " | $\text{K}_2\text{Cu}(\text{SO}_4)_2 \cdot 6\text{H}_2\text{O}$ | 11.69 |
| " Nickel " | $\text{K}_2\text{Ni}(\text{SO}_4)_2 \cdot 6\text{H}_2\text{O}$ | 6.88 |
| " Zinc " | $\text{K}_2\text{Zn}(\text{SO}_4)_2 \cdot 6\text{H}_2\text{O}$ | 13.19 |

SOLUBILITY OF POTASSIUM NICKEL SULPHATE AND ALSO OF POTASSIUM ZINC SULPHATE IN WATER AT DIFFERENT TEMPERATURES.

| t° . | Grams per 100 Gms. H_2O . | | t° . | Grams per 100 Grams H_2O . | |
|-------------|--|--|-------------|--|--|
| | $\text{K}_2\text{Ni}(\text{SO}_4)_2 \cdot 6\text{H}_2\text{O}$. | $\text{K}_2\text{Zn}(\text{SO}_4)_2 \cdot 6\text{H}_2\text{O}$. | | $\text{K}_2\text{Ni}(\text{SO}_4)_2 \cdot 6\text{H}_2\text{O}$. | $\text{K}_2\text{Zn}(\text{SO}_4)_2 \cdot 6\text{H}_2\text{O}$. |
| 0 | 6 | 13 | 40 | 23 | 45 |
| 10 | 9 | 19 | 50 | 28 | 56 |
| 20 | 14 | 26 | 60 | 35 | 72 |
| 25 | 16 | 30 | 70 | 43 | 88 |
| 30 | 18 | 35 | | | |

SOLUBILITY OF THE THREE HYDRATES OF POTASSIUM FERRO SULPHATE IN WATER AT DIFFERENT TEMPERATURES.

(Kuster and Thiel — Z. anorg. Ch. 21, 116, '99.)

| t° . | $\text{K}_2\text{SO}_4 \cdot \text{FeSO}_4 \cdot 6\text{H}_2\text{O}$. | | $\text{K}_2\text{SO}_4 \cdot \text{FeSO}_4 \cdot 4\text{H}_2\text{O}$. | | $\text{K}_2\text{SO}_4 \cdot \text{FeSO}_4 \cdot 2\text{H}_2\text{O}$. | |
|-------------|---|---|---|---|---|---|
| | cc. N/10 KMnO_4 per 2 cc. Solution. | Gms. $\text{K}_2\text{SO}_4 \cdot \text{FeSO}_4$ per 100 cc. Sol. | cc. N/10 KMnO_4 per 2 cc. Solution. | Gms. $\text{K}_2\text{SO}_4 \cdot \text{FeSO}_4$ per 100 cc. Sol. | cc. N/10 KMnO_4 per 2 cc. Solution. | Gms. $\text{K}_2\text{SO}_4 \cdot \text{FeSO}_4$ per 100 cc. Sol. |
| 0.5 | 12.4 | 18.36 | 15.5 | 22.94 | 15.4 | 22.79 |
| 17.2 | 17.0 | 25.16 | 18.1 | 26.79 | 21.6 | 31.98 |
| 40.1 | 24.8 | 36.72 | 21.9 | 32.41 | 27.6 | 40.86 |
| 60 | 29.0 | 42.93 | 24.1 | 35.68 | 28.8 | 42.63 |
| 80 | 30.6 | 45.29 | 27.3 | 40.46 | 28.6 | 42.34 |
| 90 | ... | ... | 29.6 | 43.82 | 28.9 | 42.73 |
| 95 | ... | ... | 29.8 | 44.11 | 27.7 | 41.01 |

SOLUBILITY OF POTASSIUM SULPHATE IN AQUEOUS SOLUTIONS OF POTASSIUM CHLORIDE, BROMIDE, AND IODIDE.

(Blarez — Compt. rend. 112, 939, '91.)

Interpolated from the original results.

| Grams Halogen Salt per 100 cc. Solution. | Grams K_2SO_4 per 100 cc. in Aq. Solutions of: | | |
|--|---|----------------|-----------------|
| | KCl at 12.5°. | KBr at 14°. | KI at 12.5°. |
| 0 | 9.9 | 10.16 | 9.9 |
| 2 | 8.3 | 9.1 | 9.2 |
| 4 | 7.0 | 8.2 | 8.4 |
| 6 | 5.7 | 7.4 | 7.7 |
| 8 | 4.6 | 6.6 | 7.2 |
| 10 | 3.5 | 6.0 | 6.6 |
| 12 | ... | 5.5 | 6.0 |

SOLUBILITY OF MIXED CRYSTALS OF POTASSIUM SULPHATE AND POTASSIUM CHROMATE AT 25°.

(Fock — Z. Kryst. Min. 28, 379, '97.)

| Milligram Mols. per Liter. | | Grams per Liter. | | Mol. per cent of K_2SO_4 in Solution. | Sp. Gr. of Solution. | Mol. per cent of K_2SO_4 in Solid Phase. |
|----------------------------|--------------|------------------|--------------|--|----------------------------|---|
| K_2SO_4 . | K_2CrO_4 . | K_2SO_4 . | K_2CrO_4 . | | | |
| 618.1 | 0.0 | 107.7 | 0.00 | 100.0 | 1.083 | 100.0 |
| 608.4 | 103 | 106.0 | 20.02 | 85.51 | 1.092 | 99.65 |
| 341.0 | 691.8 | 59.46 | 134.5 | 33.01 | 1.141 | 97.30 |
| 174.8 | 1496.0 | 30.47 | 290.5 | 10.50 | 1.231 | 91.97 |
| 110.7 | 2523 | 19.30 | 490.5 | 4.21 | 1.356 | 28.43 |
| 100.6 | 2687 | 17.54 | 522.3 | 3.60 | 1.377 | 2.41 |
| 0.0 | 2847 | 0.0 | 553.5 | 0.00 | 1.398 | 0.00 |
| 734.0 | 0.0 | 127.9 | 0.0 | 100.0 | 1.0863 | 100.0 |
| 617.0 | 103.4 | 107.6 | 20.1 | 85.65 | 1.0934 | 99.78 |
| 463 | 452.7 | 80.72 | 88.0 | 55.55 | 1.1235 | 98.49 |
| 279 | 948.2 | 48.64 | 184.4 | 22.72 | 1.1700 | 96.07 |
| 153 | 1469 | 26.68 | 285.6 | 9.41 | 1.2255 | 85.77 |
| 296 | 2681 | 51.61 | 521.2 | 21.09 | 1.3688 | 25.73 |
| 0.0 | 2715 | 0.00 | 527.8 | 0.00 | 1.3781 | 0.00 |

SOLUBILITY OF POTASSIUM SODIUM SULPHATES IN WATER.

| Double Salt. | t°. | Gms. per 100 Gms. H_2O . | Authority. |
|---------------------------|-------|-------------------------------|--|
| $3K_2SO_4 \cdot Na_2SO_4$ | 103.5 | 40.8 | (Penny — Phil. Mag. [4] 10, 401, '55.) |
| $5K_2SO_4 \cdot Na_2SO_4$ | 4.4 | 9.2 | (Gladstone — J. Ch. Soc. 6, 11, '54.) |
| " | 12.7 | 10.1 | " |
| " | 100.0 | 25.0 | " |

POTASSIUM SULPHATE

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SOLUBILITY OF POTASSIUM SULPHATE IN AQUEOUS ALCOHOL.

(Gerardin — Ann. chim. phys. [4] 5, 147, '65; Schiff — Liebig's Ann. 118, 362, '61.)

In Aq. Alcohol of 0.939
Sp. Gr.=40 Wt. %.

In Alcohol of Different
Strengths at 15°.

| t°. | Gms. K ₂ SO ₄ per 100 Gms. Alcohol. | Weight per cent Alcohol. | Gms. K ₂ SO ₄ per 100 Gms. Sat. Sol. |
|-----|---|--------------------------------|--|
| 40 | 0.16 | 10 | 3.90 |
| 80 | 0.21 | 20 | 1.46 |
| 60 | 0.92 | 30 | 0.56 |
| | | 40 | 0.21 |

100 gms. glycerine of 1.255 Sp. Gr. dissolve 1.316 gms. K₂SO₄ at ord. temp.

(Vogel — Neues Report, Pharm. 16, 557 '67.)

SOLUBILITY OF POTASSIUM SULPHATE IN AQUEOUS ACETIC ACID AND IN AQUEOUS PHENOL SOLUTIONS AT 25°.

(Rothmund and Wilsmore — Z. physik. Ch. 40, 619, '02.)

In Aq. Acetic Acid.

In Aq. Phenol.

| Mols. per Liter. | | Grams per Liter. | | Mols. per Liter. | | Grams per Liter. | |
|-----------------------|----------------------------------|-----------------------|----------------------------------|-----------------------------------|----------------------------------|-----------------------------------|----------------------------------|
| CH ₃ COOH. | K ₂ SO ₄ . | CH ₃ COOH. | K ₂ SO ₄ . | C ₆ H ₅ OH. | K ₂ SO ₄ . | C ₆ H ₅ OH. | K ₂ SO ₄ . |
| 0.0 | 0.6714 | 0.0 | 117.0 | 0.0 | 0.6714 | 0.0 | 117.0 |
| 0.07 | 0.6619 | 4.2 | 115.4 | 0.032 | 0.6598 | 3.01 | 115.0 |
| 0.137 | 0.6559 | 8.22 | 114.4 | 0.064 | 0.6502 | 6.02 | 113.3 |
| 0.328 | 0.6350 | 19.68 | 110.8 | 0.127 | 0.6310 | 11.94 | 110.0 |
| 0.578 | 0.6097 | 34.68 | 106.3 | 0.236 | 0.6042 | 22.19 | 105.3 |
| 1.151 | 0.5556 | 69.06 | 96.87 | 0.308 | 0.5834 | 28.97 | 101.7 |
| 2.183 | 0.4743 | 128.58 | 82.70 | 0.409 | 0.5572 | 38.46 | 97.2 |
| | | | | 0.464 | 0.5480 | 43.63 | 95.5 |
| | | | | 0.498 (sat.) | 0.5377 | 46.82 | 93.8 |

100 grams water dissolve 10.4 grams K₂SO₄ + 219.0 grams sugar at 31.25°, or 100 grams sat. solution contain 3.18 grams K₂SO₄ + 66.74 grams sugar.

(Köhler — Z. Ver. Zuckerind. 47, 447, '97.)

POTASSIUM ACID SULPHATE KHSO₄.

SOLUBILITY IN WATER.

(Kremers — Liebig's Ann. 92, 497, '54.)

| t° | 0° | 20° | 40° | 100° |
|--|------|------|------|-------|
| Gms. KHSO ₄ per 100 gms. H ₂ O | 36.3 | 51.4 | 67.3 | 121.6 |

POTASSIUM PERSULPHATE K₂S₂O₈.

100 gms. H₂O dissolve 1.77 gms. K₂S₂O₈ at 0°.

(Marshall — J. Ch. Soc. 59, 771, '91.)

POTASSIUM SODIUM THIOSULPHATE KNaS₂O₃.2H₂O.

POTASSIUM SODIUM HYDROGEN SULPHITE KNa₂H(SO₃)₂.4H₂O.

100 grams H₂O dissolve 213.7 grams KNaS₂O₃.2H₂O (a) at 15°.

100 grams H₂O dissolve 205.3 grams KNaS₂O₃.2H₂O (b) at 15°.

100 grams H₂O dissolve 69.0 grams KNa₂H(SO₃)₂.4H₂O at 15°.

(Schwicker — Ber. 22, 1731, '89.)

POTASSIUM SULPHOCYANIDE KSCN.

100 grams H_2O dissolve 177.2 grams KSCN at 0° , and 217.0 grams at 20° .

(Rüdorff — Ber. 2, 68, '69.)

SOLUBILITY OF POTASSIUM SULPHOCYANIDE IN ACETONE, AMYL ALCOHOL, ETC.

(von Laszcynski — Ber. 27, 2285, '94.)

| In Acetone. | | In Amyl Alcohol. | | In Ethyl Acetate. | | In Pyridine. | |
|-------------|---------------------------------------|------------------|--|-------------------|--|--------------|------------------------------------|
| t°. | Gms. KSCN per 100 Gms. $(CH_3)_2CO$. | t°. | Gms. KSCN per 100 Gms. $C_5H_{11}OH$. | t°. | Gms. KSCN per 100 Gms. $CH_3COOC_2H_5$. | t°. | Gms. KSCN per 100 Gms. C_5H_5N . |
| 22 | 20.75 | 13 | 0.18 | 0 | 0.44 | 0 | 6.75 |
| 58 | 20.40 | 65 | 1.34 | 14 | 0.40 | 20 | 6.15 |
| | | 100 | 2.14 | 79 | 0.20 | 58 | 4.97 |
| | | 133.5 | 3.15 | | | 97 | 3.88 |
| | | | | | | 115 | 3.21 |

POTASSIUM (Bi) TARTRATE (Mono) $KHC_4H_4O_6$ Cream of Tartar.**SOLUBILITY OF MONO POTASSIUM TARTRATE IN WATER.**

(Alluard — Liebig's Ann. 133, 292, '65; Roelofsen — Am. Ch. J. 16, 466, '94; Blarez — Compt. rend. 112, 434, '91; at 20° , Maganini — Gazz. chim. ital. 31, II, 542, '01; at 25° , Noyes and Clement — Z. physik. Ch. 13, 413, '94.)

| t°. | Gms. $KHC_4H_4O_6$ per 100 Gms. Solution. | | | t°. | Gms. $KHC_4H_4O_6$ per 100 Gms. Solution. | | |
|-----|---|-------------------|-----------|-----|---|-----|------|
| | 0.30 (R.) | 0.32 (A.) | 0.35 (B.) | | 0.96 | 1.3 | 1.29 |
| 0 | 0.30 (R.) | 0.32 (A.) | 0.35 (B.) | 40 | 0.96 | 1.3 | 1.29 |
| 10 | 0.37 | 0.40 | 0.42 | 50 | 1.25 | 1.8 | 1.80 |
| 20 | 0.49 | 0.53 (M.) | 0.60 | 60 | | 2.4 | |
| 25 | 0.58 | 0.654 (N. and C.) | 0.74 | 80 | | 4.4 | |
| 30 | 0.69 | 0.9 (A.) | 0.89 | 100 | | 6.5 | |

SOLUBILITY OF POTASSIUM ACID TARTRATE ($KHC_4H_4O_6$) IN NORMAL SOLUTIONS OF ACIDS AT 20° .

(Ostwald; Huecke — J. pr. Ch. [2] 29, 49, '84.)

Purified tartrate was added in excess to normal solutions of the acids, and after shaking clear 1 cc. portions of each solution were withdrawn and titrated with approximately $N/10$ $Ba(OH)_2$ solution; 1 cc. normal acid requiring 10.63 cc. of the $Ba(OH)_2$ solution.

| Acid. | Gms. Acid per 100 cc. Solvent. | | cc. $N/10$ $Ba(OH)_2$ per 1 cc. Solution. | Gms. $KHC_4H_4O_6$ per 100 cc. Solution. | Acid. | Gms. Acid per 100 cc. Solvent. | | cc. $N/10$ $Ba(OH)_2$ per 1 cc. Solution. | Gms. $KHC_4H_4O_6$ per 100 cc. Solution. |
|---------------|--------------------------------|--|---|--|--------------------|--------------------------------|--|---|--|
| | | | | | | | | | |
| HNO_3 | 6.31 | | 5.77* | 10.21 | $C_2H_5SO_3H$ | 11.0 | | 5.01* | 8.87 |
| HCl | 3.65 | | 5.32 | 9.42 | $HO.(CH_2)_2SO_3H$ | 12.61 | | 5.33 | 9.43 |
| HBr | 8.10 | | 5.38 | 9.75 | $C_6H_5SO_3H$ | 15.81 | | 5.25 | 9.29 |
| HI | 12.80 | | 5.43 | 9.61 | $HCOOH$ | 4.60 | | 0.45 | 0.80 |
| H_2SO_4 | 4.90 | | 3.97 | 7.03 | CH_3COOH | 6.00 | | 0.27 | 0.48 |
| HCH_2SO_4 | 11.21 | | 5.58 | 12.44 | $CH_2ClCOOH$ | 9.45 | | 1.01 | 1.79 |
| HCH_2SO_4 | 12.61 | | 5.41 | 9.58 | C_2H_5COOH | 7.40 | | 0.24 | 0.42 |
| $HC_2H_3SO_4$ | 14.01 | | 5.21 | 9.22 | C_2H_7COOH | 8.81 | | 0.23 | 0.41 |

* The figures in this column show the amount of the $Ba(OH)_2$ solution in excess of that which would have been required by the normal acid solution alone in each case, viz., 10.63 cc. They, therefore, correspond to the amount of $KHC_4H_4O_6$ dissolved in 1 cc. of each saturated solution, and when multiplied by 1.77 give the grams of $KHC_4H_4O_6$ per 100 cc. solution.

SOLUBILITY OF MONO POTASSIUM TARTRATE ($\text{KHC}_4\text{H}_4\text{O}_6$) IN AQUEOUS SOLUTIONS OF ELECTROLYTES AT 25° .

(Noyes and Clement — Z. physik. Ch. 13, 413, '94; Magnanini — Gazz. chim. ital. 31, II, 542, '01.)

| Electro-lyte. | Gms. Equiv. per Liter. | | Gms. per Liter. | | Electro-lyte. | Gm. Equiv. per Liter. | | Grams per Liter. | |
|-------------------------|------------------------|------------------------------------|-----------------|------------------------------------|----------------------------------|-----------------------|------------------------------------|------------------|------------------------------------|
| | Electro-lyte. | $\text{KHC}_4\text{H}_4\text{O}_6$ | Electro-lyte. | $\text{KHC}_4\text{H}_4\text{O}_6$ | | Electro-lyte. | $\text{KHC}_4\text{H}_4\text{O}_6$ | Electro-lyte. | $\text{KHC}_4\text{H}_4\text{O}_6$ |
| KCl | 0.025 | 0.0254 | 1.86 | 0.4788 | CH_3COOK | 0.05 | 0.0410 | 4.91 | 0.7718 |
| " | 0.05 | 0.0196 | 3.73 | 0.3680 | " | 0.10 | 0.0504 | 9.82 | 0.9486 |
| " | 0.10 | 0.0133 | 7.46 | 0.2509 | " | 0.20 | 0.0634 | 19.63 | 1.1930 |
| " | 0.20 | 0.0087 | 14.92 | 0.1636 | KHSO_4 (20°) | 0.01 | 0.0296 | 1.36 | 0.560 |
| KClO_3 | 0.025 | 0.0256 | 3.06 | 0.4821 | " | 0.02 | 0.0500 | 2.72 | 0.941 |
| " | 0.05 | 0.0197 | 6.13 | 0.3716 | " | 0.10 | 0.1597 | 13.62 | 3.006 |
| " | 0.10 | 0.0138 | 12.26 | 0.2601 | $(\text{COOK})_2$ (20°) | 0.01 | 0.0113 | 1.28 | 0.213 |
| " | 0.20 | 0.0092 | 24.52 | 0.1728 | " | 0.02 | 0.0424 | 2.56 | 0.798 |
| KBr | 0.05 | 0.0197 | 5.95 | 0.3699 | " | 0.10 | 0.1132 | 12.82 | 2.130 |
| " | 0.10 | 0.0134 | 11.91 | 0.2517 | HCl | 0.013 | 0.0367 | 0.45 | 0.690 |
| " | 0.20 | 0.0087 | 23.82 | 0.1629 | " | 0.025 | 0.0428 | 0.91 | 0.806 |
| KI | 0.05 | 0.0196 | 8.30 | 0.3687 | " | 0.050 | 0.0589 | 1.82 | 1.109 |
| " | 0.10 | 0.0132 | 16.61 | 0.2492 | NaCl | 0.05 | 0.0376 | 2.92 | 0.708 |
| " | 0.20 | 0.0086 | 33.22 | 0.1619 | " | 0.10 | 0.0397 | 5.85 | 0.748 |
| KNO_3 | 0.05 | 0.0195 | 5.06 | 0.3676 | " | 0.20 | 0.0428 | 11.70 | 0.805 |
| " | 0.10 | 0.0136 | 10.12 | 0.2551 | NaClO_3 | 0.05 | 0.0382 | 5.32 | 0.718 |
| " | 0.20 | 0.0090 | 20.24 | 0.1696 | " | 0.10 | 0.0405 | 10.65 | 0.763 |
| K_2SO_4 | 0.05 | 0.0208 | 4.36 | 0.3921 | " | 0.20 | 0.0446 | 21.30 | 0.840 |
| " | 0.10 | 0.0147 | 8.72 | 0.2769 | | | | | |
| " | 0.20 | 0.0100 | 17.44 | 0.1888 | | | | | |

SOLUBILITY OF MONO POTASSIUM TARTRATE IN AQUEOUS ALCOHOL SOLUTIONS.

(Roelofszen — Am. Ch. J. 16, 466, '94; Wenger — *Ibid.* 14, 624, '92.)

NOTE. — The original results were plotted on cross-section paper and the following figures read from the curves.

| t° . | Grams $\text{KHC}_4\text{H}_4\text{O}_6$ per 100 cc. of Aq. Alcohol of: | | | | | |
|-------------|---|--------------|--------------|--------------|--------------|--------------|
| | 10 per cent. | 20 per cent. | 30 per cent. | 40 per cent. | 60 per cent. | 80 per cent. |
| 0 | 17 | 11 | 7 | 6 | 6 | 6 |
| 10 | 22 | 14 | 8 | 7 | 6 | 6 |
| 20 | 29 | 18 | 11 | 8 | 6 | 6 |
| 25 | 34 | 21 | 12 | 9.5 | 6.5 | 5.5 |
| 30 | 40 | 25 | 13 | 11 | 7 | 5.5 |
| 40 | 55 | 36 | 19 | 14 | 7.5 | 5 |
| 50 | 87 | 55 | 29 | 19 | 8 | 5 |

POTASSIUM FLUO TITANATE $\text{K}_2\text{TiF}_6 \cdot \text{H}_2\text{O}$.

SOLUBILITY IN WATER.

(Marignac — Ann. chim. phys. [4] 8, 65, '66.)

| t° | 0° | 3° | 6° | 10° | 14° | 20° |
|---|-----------|-----------|-----------|------------|------------|------------|
| Gms. K_2TiF_6 per 100 gms. H_2O | 0.55 | 0.67 | 0.77 | 0.91 | 1.04 | 1.28 |

POTASSIUM VANADATE $K_3V_5O_{14} \cdot 5H_2O$.100 grams H_2O dissolve 19.2 grams at 17.5° .

(Radan — Liebig's Ann. 251, 120, '89.)

POTASSIUM ZINC VANADATE $KZnV_5O_{14} \cdot 8H_2O$.100 grams H_2O dissolve 0.41 gram of the salt (Radan).**PRASEODYMIUM SULPHATE** $Pr_2(SO_4)_3$.

SOLUBILITY IN WATER.

(Muthmann and Rölig — Ber. 31, 1727, '98.)

| t°. | Gms. $Pr_2(SO_4)_3$ per 100 Gms. | | Solid Phase. | t°. | Gms. $Pr_2(SO_4)_3$ per 100 Gms. | | Solid Phase. |
|-----|-------------------------------------|--------|----------------------------|-----|-------------------------------------|--------|--|
| | Solution. | Water. | | | Solution. | Water. | |
| 0 | 16.5 | 19.8 | $Pr_2(SO_4)_3 \cdot 8H_2O$ | 75 | 4.0 | 4.2 | $Pr_2(SO_4)_3 \cdot 8H_2O$ |
| 18 | 12.3 | 14.1 | " | 85 | 1.5 | 1.55 | $Pr_2(SO_4)_3 \cdot 8H_2O$ + $Pr_2(SO_4)_3 \cdot 5H_2O$ |
| 35 | 9.4 | 10.4 | " | | | | |
| 55 | 6.6 | 7.1 | " | 95 | 1.0 | 1.01 | $Pr_2(SO_4)_3 \cdot 5H_2O$ |

PROPIONIC ALDEHYDE C_2H_5COH .100 grams H_2O dissolve 16 grams aldehyde at 20° .

(Vaubel — J. pr. Ch. 59, 30, '99.)

PROPIONITRIL C_2H_5CN .

SOLUBILITY IN WATER.

Synthetic method used. See Note, page 9.

(Rothmund — Z. physik. Ch. 26, 474, '98.)

| t°. | Wt. per cent C_2H_5CN in: | | t°. | Wt. per cent C_2H_5CN in: | |
|-----|-----------------------------|----------------------|---------------------|-----------------------------|----------------------|
| | Aq. Layer. | C_2H_5CN Layer. | | Aq. Layer. | C_2H_5CN Layer. |
| 40 | 10.7 | 92.1 | 95 | 19.6 | 78.0 |
| 50 | 11.6 | 90.5 | 100 | 22.4 | 75.5 |
| 60 | 12.7 | 88.5 | 105 | 26.0 | 72.1 |
| 70 | 13.2 | 86.1 | 110 | 32.0 | 66.5 |
| 80 | 14.9 | 83.4 | 113.1 (crit. temp.) | 48.3 | |
| 90 | 17.6 | 80.2 | | | |

PROPYL ACETATE, Butyrate and Propionate.

SOLUBILITY OF EACH IN AQUEOUS ALCOHOL MIXTURES.

(Bancroft — Phys. Rev. 3, 205, '05, calc. from Pfeiffer.)

| cc. Alco- hol in Mixture. | cc. H_2O Added to Cause Separation * in: | | | cc. Alco- hol in Mixture. | cc. H_2O Added to cause Separation * in: | | |
|---------------------------------|--|-------------------|---------------------|---------------------------------|--|-------------------|---------------------|
| | P. Ace- tate. | P. Buty- rate. | P. Propio- nate. | | P. Ace- tate. | P. Buty- rate. | P. Propio- nate. |
| 3 | 4.50 | 1.19 | 1.58 | 21 | 58.71 | 19.68 | 27.83 |
| 6 | 10.48 | 3.55 | 4.70 | 24 | | 23.72 | 33.75 |
| 9 | 17.80 | 6.13 | 8.35 | 30 | | 32.10 | 47.15 |
| 12 | 26.00 | 9.05 | 12.54 | 36 | | 41.55 | 63.18 |
| 15 | 35.63 | 12.31 | 17.15 | 42 | | 51.60 | 83.05 |
| 18 | 47.50 | 15.90 | 22.27 | 48 | | 62.40 | 107.46 |
| | | | | 54 | | 73.85 | ... |

* cc. H_2O added to cause the separation of a second phase in mixtures of the given amounts of alcohol and 3 cc. portions of propyl acetate, butyrate and propionate.

**SOLUBILITY OF PROPYL ACETATE, FORMATE, AND PROPIONATE
IN WATER.**

 100 cc. H₂O dissolve 1.7 gms. propyl acetate at 22°.

 100 cc. H₂O dissolve 2.1 gms. propyl formate at 22°.

(Traube — Ber. 17, 2304, '84.)

 100 cc. H₂O dissolve 0.6 cc. propyl propionate at 25°.

(Bancroft.)

PROPYL CHLORIDE, Bromide, etc.
SOLUBILITY IN WATER.

(Rex — Z. physik. Ch. 55, 355, '06.)

| Propyl Compound. | Grams P. Compound per 100 Gms. H ₂ O at: | | | |
|---|---|-------|-------|-------|
| | 0°. | 10°. | 20°. | 30°. |
| CH ₃ CH ₂ CH ₂ Cl (normal) | 0.376 | 0.323 | 0.272 | 0.277 |
| CH ₃ CH ₂ CH ₂ Br “ | 0.298 | 0.263 | 0.245 | 0.247 |
| CH ₃ CH ₂ CH ₂ I “ | 0.114 | 0.103 | 0.107 | 0.103 |
| (CH ₃) ₂ CHCl (iso) | 0.440 | 0.363 | 0.305 | 0.304 |
| (CH ₃) ₂ CHBr “ | 0.418 | 0.365 | 0.318 | 0.318 |
| (CH ₃) ₂ CHI “ | 0.167 | 0.143 | 0.140 | 0.134 |

PROPYLENE C₃H₆. SOLUBILITY IN WATER.

(Than — Liebig's Ann. 123, 187, '62.)

| t°. | β. | q. |
|-----|--------|---------|
| 0 | 0.4465 | 0.0834 |
| 5 | 0.3493 | 0.06504 |
| 10 | 0.2796 | 0.0519 |
| 15 | 0.2366 | 0.0437 |
| 20 | 0.2205 | 0.0405 |

For values of β and q, see Ethane, page 133.

PYRENE C₁₆H₁₀
SOLUBILITY IN TOLUENE AND IN ABSOLUTE ALCOHOL.

100 gms. toluene dissolve 16.54 gms. pyrene at 18°.

100 gms. absolute alcohol dissolve 1.37 gms. pyrene at 10° and 3.08 gms. at b. pt.

PYROGALLOL C₆H₃(OH)₃ 1, 2, 3.
SOLUBILITY IN WATER, ETC.

(U. S. P.)

 100 gms. water dissolve 62.5 gms. C₆H₃(OH)₃ at 25°.

 100 gms. alcohol dissolve 100.0 gms. C₆H₃(OH)₃ at 25°.

 100 gms. ether dissolve 90.9 gms. C₆H₃(OH)₃ at 25°.

QUININE $C_{20}H_{24}N_2O_2$.**SOLUBILITY OF QUININE AND OF QUININE SALTS IN WATER AND OTHER SOLVENTS.**

(U. S. P.)

| Compound. | Grams. Quinine Compound per 100 Grams Solvent in: | | | | | |
|--|---|---------|----------|---------|-------------|------------|
| | Water. | | Alcohol. | Ether. | Chloroform. | Glycerine. |
| | At 25°. | At 80°. | At 25°. | At 25°. | At 25°. | At 25°. |
| $C_{20}H_{24}N_2O_2$ | 0.057 | 0.123 | 166.6 | 22.2 | 52.6 | 0.633 |
| $C_{20}H_{24}N_2O_2 \cdot 3H_2O$ | 0.065 | 0.129 | 166.6 | 76.9 | 62.5 | 0.472 |
| $C_{20}H_{24}N_2O_2 \cdot HCl \cdot H_2O$ | 5.55 | 250.0 | 166.6 | 0.417 | 122.0 | 12.2 |
| $C_{20}H_{24}N_2O_2 \cdot 2C_2H_4(OH) \cdot COOH \cdot H_2O$ | 1.30 | 2.86 | 9.09 | 0.91 | 2.70 | 6.25 |
| $(C_{20}H_{24}N_2O_2)_3 \cdot H_2SO_4 \cdot 7H_2O$ | 0.139 | 2.22 | 1.16 | | 0.25 | 2.78 |
| $C_{20}H_{24}N_2O_2 \cdot H_2SO_4 \cdot 7H_2O$ | 11.77 | 117.7 | 5.55 | 0.056 | 0.109 | 5.55 |
| $C_{20}H_{24}N_2O_2 \cdot HBr \cdot H_2O$ | 2.5 | 33.3 | 149.2 | 6.2 | ... | 12.5 |

SOLUBILITY OF QUININE IN AQUEOUS SOLUTIONS OF CAUSTIC ALKALIES.

(Doumer and Deraux — J. pharm. chim. [6] 1, 50, '95.)

METHOD. — A one per cent solution of quinine sulphate containing a very small amount of HCl was gradually added to 200 cc. portions of the caustic alkali solutions of the various concentrations stated, and the point noted at which a precipitate of the appearance corresponding to that of 1 cc. of milk in 100 cc. of water, remained undissolved.

| In Aq. Ammonia. | | In Aq. Sodium Hydrate. | | In Aq. Pot. Hydrate. | |
|-----------------------------------|-----------------------------------|---------------------------------|-----------------------------------|--------------------------------|-----------------------------------|
| Gms. NH_3 per 200 cc. Solution. | Gms. Anhydrous Quinine Dissolved. | Gms. NaOH per 200 cc. Solution. | Gms. Anhydrous Quinine Dissolved. | Gms. KOH per 200 cc. Solution. | Gms. Anhydrous Quinine Dissolved. |
| 0.52 | 0.084 | 0.007 | 0.092 | 0.612 | 0.088 |
| 0.65 | 0.084 | 0.012 | 0.091 | 1.512 | 0.082 |
| 4.59 | 0.096 | 0.740 | 0.090 | 3.456 | 0.068 |
| 13.08 | 0.122 | 2.160 | 0.079 | 10.944 | 0.039 |
| 18.88 | 0.144 | 3.188 | 0.056 | 44.704 | 0.006 |
| 25.19 | 0.174 | 6.172 | 0.044 | | |
| 35.79 | 0.184 | 8.537 | 0.021 | | |
| | | 17.074 | 0.015 | | |

SOLUBILITY OF QUININE SALTS IN WATER.

(Regnault and Willejean — Chem. Centralb. 18, 252, '87.)

| Salt. | °. | Gms. Salt per 100 Gms. H_2O . | Salt. | °. | Gms. Salt per 100 Gms. H_2O . |
|-----------------------|----|---------------------------------|--------------------|-------|---------------------------------|
| Brom Hydrate (basic) | 14 | 2.06 | Salicylate (basic) | 15 | 0.114 |
| " (neutral) | 12 | 12.33 | Sulphate " | 14 | 0.139 |
| " " | 14 | 13.19 | " " | 16 | 0.153 |
| " " | 16 | 14.79 | " " | 18 | 0.160 |
| " " | 15 | 14.20 | " (neutral) | 15 | 8.50 |
| Chlor Hydrate (basic) | 12 | 3.80 | " " | 17 | 8.90 |
| " " | 14 | 4.14 | " " | 18 | 9.62 |
| " " | 15 | 4.25 | Valerate (basic) | 12-16 | 2.59 |
| Lactate | 15 | 10.03 | | | |
| " | 37 | 16.18 | | | |

RESORCINOL.

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RESORCINOL $C_6H_4(OH)_2$ 1, 3.

SOLUBILITY IN:

| t°. | Water. | | | Ethyl Alcohol. | | |
|-----|---|----------------------------------|-----------|-----------------------|----------------------------------|-----------|
| | (Speyers — Am. J. Sci. [4] 14, 294, '02.) | | | (Speyers.) | | |
| | Sp. Gr. of Solutions. | Gms. $C_6H_4(OH)_2$ per 100 Gms. | | Sp. Gr. of Solutions. | Gms. $C_6H_4(OH)_2$ per 100 Gms. | |
| | | Water. | Solution. | | Alcohol. | Solution. |
| 0 | 1.101 | 60 | 37.5 | 1.033 | 210 | 67.8 |
| 10 | 1.118 | 81 | 44.8 | 1.036 | 223 | 69.0 |
| 20 | 1.134 | 103 | 50.7 | 1.041 | 236 | 70.3 |
| 25 | 1.142 | 117 | 53.9 | 1.045 | 243 | 70.8 |
| 30 | 1.148 | 131 | 56.7 | 1.048 | 250 | 71.4 |
| 40 | 1.157 | 161 | 58.9 | 1.056 | 266 | 72.7 |
| 50 | 1.165 | 198 | 66.5 | 1.065 | 286 | 74.1 |
| 60 | 1.172 | 246 | 71.1 | 1.075 | 311 | 75.7 |
| 70 | 1.176 | 320 | 76.2 | 1.087 | 341 | 77.3 |
| 80 | 1.179 | 487 | 82.9 | 1.104 | 375 | 78.9 |

NOTE. — The original results of Speyers are given in terms of mols. per 100 mols. H_2O .

According to Vaubel, 100 gms. H_2O dissolve 175.5 gms. $C_6H_4(OH)_2$, or 100 gms. sat. solution contain 63.7 gms. at 20°. Sp. Gr. of sol. = 1.1335.

(J. pr. Ch. [2] 52, 73, '95.)

SOLUBILITY OF RESORCINOL IN BENZENE.

(Rothmund — Z. physik. Ch. 26, 475, '98.)

Synthetic method used. See Note, p. 9.

| t°. | Gms. $C_6H_4(OH)_2$ per 100 Gms. | | t°. | Gms. $C_6H_4(OH)_2$ per 100 Gms. | |
|-----|----------------------------------|-----------------------|---------------------|----------------------------------|-----------------------|
| | C_6H_6 Layer. | $C_6H_4(OH)_2$ Layer. | | C_6H_6 Layer. | $C_6H_4(OH)_2$ Layer. |
| 60 | 4.8 | 79.4 | 90 | 13.0 | 71.3 |
| 70 | 6.6 | 77.5 | 100 | 19.5 | 65.7 |
| 80 | 9.2 | 75.0 | 105 | 24.6 | 60.7 |
| | | | 109.3 (crit. temp.) | 42.4 | |

DISTRIBUTION OF RESORCINOL BETWEEN WATER AND ORGANIC SOLVENTS AT ORDINARY TEMPERATURE.

(Vaubel — J. pr. Ch. [2] 67, 478, '03.)

| Gms. $C_6H_4(OH)_2$ Used. | Solvents. | | Gms. $C_6H_4(OH)_2$ in: | |
|---------------------------|-----------------|-----------------|-------------------------|------------------------|
| | | | H_2O Layer. | Organic Solvent Layer. |
| 1.191 | 60 cc. H_2O + | 30 cc. Ether | 0.2014 | 0.9806 |
| 1.191 | 60 cc. H_2O + | 60 cc. Ether | 0.2475 | 0.9525 |
| 0.800 | 40 cc. H_2O + | 40 cc. Benzene | 0.5873 | 0.2127 |
| 0.800 | 40 cc. H_2O + | 80 cc. Benzene | 0.5773 | 0.2227 |
| 0.500 | 50 cc. H_2O + | 50 cc. CCl_4 | 0.4885 | 0.0115 |
| 0.500 | 50 cc. H_2O + | 100 cc. CCl_4 | 0.4880 | 0.0120 |
| 0.500 | 50 cc. H_2O + | 150 cc. CCl_4 | 0.4880 | 0.0120 |

RHODIUM SALTS. SOLUBILITY IN WATER.

(Jorgensen — J. pr. Ch. [2] 27, 433, '83; 34, 394, '86; 44, 51, '91.)

| Salt. | Formula. | t°. | Gms. per 100 Gms. H_2O . |
|---------------------------------|--------------------------------------|---------|----------------------------|
| Chloro Purpleo Rhodium Chloride | $ClRh(NH_3)_5Cl_2$ | 17 | 0.56 |
| Luteo Rhodium Chloride | $Rh(NH_3)_6Cl_3$ | 8 | 13.3 |
| Luteo Rhodium Nitrate | $Rh(NH_3)_6(NO_3)_3$ | ord. t. | 2.1 |
| Luteo Rhodium Sulphate | $[Rh(NH_3)_6]_2(SO_4)_3 \cdot 5H_2O$ | 20 | 2.3 |

RUBIDIUM ALUMS.**SOLUBILITY IN WATER.**

(Locke — Am. Ch. J. 27, 374, '01.)

| Alum. | Formula. | t°. | Gms. Alum per 100 Gms. H ₂ O. | | |
|-------------------|---|-----|--|-----------|----------|
| | | | Anhydrous. | Hydrated. | G. Mols. |
| Rb. Aluminum Alum | RbAl(SO ₄) ₂ ·12H ₂ O | 25 | 1.81 | 3.15 | 0.0059 |
| " | " | 30 | 2.19 | ... | 0.0072 |
| " | " | 35 | 2.66 | ... | 0.0087 |
| " | " | 40 | 3.22 | ... | 0.0106 |
| Rb. Chromium Alum | RbCr(SO ₄) ₂ ·12H ₂ O | 25 | 2.57 | 4.34 | 0.0079 |
| " | " | 30 | 3.17 | ... | 0.0096 |
| " | " | 35 | 4.11 | ... | 0.0128 |
| " | " | 40 | 5.97 | ... | 0.0181 |
| Rb. Vanadium Alum | RbV(SO ₄) ₂ ·12H ₂ O | 25 | 5.79 | 9.93 | 0.0177 |
| Rb. Iron Alum | RbFe(SO ₄) ₂ ·12H ₂ O | 25 | 9.74 | 16.98 | 0.0294 |
| " | " | 30 | 20.24 | ... | 0.0617 |

Biltz and Wilke (Z. anorg. Ch. 48, 299, '06) find for the solubility of rubidium iron alum in water, at 6.6°, 4.55 gms. per 100 cc. solution; at 25°, 29.0 gms.; and at 40°, 52.6 gms.

RUBIDIUM FLUOBORIDE RbBF₄.

100 gms. H₂O dissolve 0.55 gm. RbBF₄ at 20°, and 1.0 gram at 100°.

(Godeffroy — Ber. 9, 1337, '76.)

RUBIDIUM BROMIDE RbBr.**SOLUBILITY IN WATER.**

(Rimbach — Ber. 38, 1557, '05.)

| t°. | Gms. RbBr per 100 Gms. | | t°. | Gms. RbBr per 100 Gms. | |
|------|------------------------|-----------|-------|------------------------|-----------|
| | Water. | Solution. | | Water. | Solution. |
| 0.5 | 89.6 | 47.26 | 39.7 | 131.85 | 56.87 |
| 5.0 | 98.0 | 49.50 | 57.5 | 152.47 | 60.39 |
| 16.0 | 104.8 | 51.17 | 113.5 | 205.21 | 67.24 |

RUBIDIUM CARBONATE Rb₂CO₃.

100 gms. absolute alcohol dissolve 0.74 gm. Rb₂CO₃.

(Bunsen.)

RUBIDIUM CHLORATE RbClO₃.**SOLUBILITY IN WATER.**

(Reissig — Liebig's Ann. 127, 33, '63.)

| t°. | 4.7°. | 13.0°. | 18.2°. | 19.0°. |
|--|-------|--------|--------|--------|
| Gms. RbClO ₃ per 100 grams H ₂ O | 2.8 | 3.9 | 4.9 | 5.1 |

RUBIDIUM (Per) CHLORATE RbClO₄.

100 grams H₂O dissolve 1.08 grams RbClO₄ at 21.3°.

(Longuimine — Liebig's Ann. 121, 123, '62.)

RUBIDIUM CHLORIDE

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RUBIDIUM CHLORIDE RbCl .**SOLUBILITY IN WATER.**

(Rimbach — Ber. 35, 1304, '02; Berkeley — Trans. Roy. Soc. (Lond.) 203 A, 207, '04.)

| t°. | Mols. RbCl per Liter. | Gms. RbCl per 100 Gms. Water. | Gms. Solution. | t°. | Mols. RbCl per Liter. | Gms. RbCl per 100 Gms. Water. | Gms. Solution. |
|-----|--------------------------|----------------------------------|----------------|-------|--------------------------|----------------------------------|----------------|
| 0 | 5.17 | 77.0 | 43.5 | 60 | 6.90 | 115.5 | 53.6 |
| 10 | 5.55 | 84.4 | 45.8 | 70 | 7.12 | 121.4 | 54.8 |
| 20 | 5.88 | 91.1 | 47.7 | 80 | 7.33 | 127.2 | 56.0 |
| 30 | 6.17 | 97.6 | 49.4 | 90 | 7.52 | 133.1 | 57.1 |
| 40 | 6.43 | 103.5 | 50.9 | 100 | 7.71 | 138.9 | 58.9 |
| 50 | 6.67 | 109.3 | 52.2 | 112.9 | 7.95 | 146.6 | 59.5 |

RUBIDIUM TELLURIUM CHLORIDE Rb_2TeCl_6 .100 gms. Aq. HCl of 1.2 Sp. Gr. dissolve 0.34 gm. Rb_2TeCl_6 at 23°.100 gms. Aq. HCl of 1.05 Sp. Gr. dissolve 13.09 gms. Rb_2TeCl_6 at 23°.
(Wheeler — Am. J. Sci. [3] 45, 267, '93.)**RUBIDIUM THALLIUM CHLORIDE** $3\text{RbClTiCl}_4 \cdot 2\text{H}_2\text{O}$.100 gms. H_2O dissolve 13.3 gms. at 18°, and 62.5 gms. at 100°.

(Godeffroy — Zeit. allgem. Öster. Apoth. No. 9, '80.)

RUBIDIUM CHROMATE (Mono) Rb_2CrO_4 .**SOLUBILITY IN WATER.**

(Schreinemaker and Filippo — Chem. Centralb. 77, I, 1321, '06.)

| t°. | Gms. RbCrO_4 per 100 Gms. Solution. | t°. | Gms. RbCrO_4 per 100 Gms. Solution. | t°. | Gms. RbCrO_4 per 100 Gms. Solution. |
|-----|--|------------------|--|-----------|--|
| - 7 | 36.65 | 50 | 47.44 | - 2.40 | 15.58 |
| 0 | 38.27 | 60.4 | 48.90 | - 3.25 | 20.03 |
| 10 | 40.23 | Solid Phase, Ice | | - 4.14 | 24.28 |
| 20 | 42.42 | - 0.6 | 6.95 | - 5.55 | 30.15 |
| 30 | 44.11 | - 1.1 | 7.22 | - 6.71 | 34.31 |
| 40 | 46.13 | - 1.57 | 9.87 | about - 7 | 36.65 |

RUBIDIUM (Di) **CHROMATE** $\text{Rb}_2\text{Cr}_2\text{O}_7$.100 grams saturated aqueous solution contain 9.47 grams $\text{Rb}_2\text{Cr}_2\text{O}_7$ at 30°.

(Schreinemaker and Filippo.)

RUBIDIUM HYDROXIDE RbOH .100 grams sat. aqueous solution contain 63.39 grams RbOH at 30°.

(Schreinemaker and Filippo.)

RUBIDIUM IODATE RbIO_3 .100 grams H_2O dissolve 2.1 grams RbIO_3 at 23°.

(Wheeler — Am. J. Sci. [3] 44, 123, '92.)

RUBIDIUM IODIDE RbI .100 grams H_2O dissolve 137.5 grams RbI at 6.9°, and 152.0 grams at 17.4°.

(Reissig — Liebig's Ann. 127, 33, '63.)

SOLUBILITY OF RUBIDIUM IODIDE IN ORGANIC SOLVENTS.

(Walden — Z. physik. Ch. 55, 713, 718, '06.)

| Solvent. | Formula. | Grams RbI per 100 cc. Solution. | |
|--------------|------------------------------------|---------------------------------|--------------|
| | | t°. | t°. |
| Acetonitril | CH ₃ CN | 1.478 at 0° | 1.350 at 25° |
| Propionitril | C ₂ H ₅ CN | 0.274 " | 0.305 " |
| Nitromethane | CH ₃ NO ₂ | 0.567 " | 0.518 " |
| Acetone | (CH ₃) ₂ CO | 0.960 " | 0.674 " |
| Furfural | C ₄ H ₃ O.CO | ... | 4.930 " |

RUBIDIUM BROM IODIDE RbBr₂I.

100 gms. sat. aq. solution contain about 44.0 gms. RbBr₂I, and the Sp. Gr. of the solution is 3.84.

(Wells and Wheeler — Am. J. Sci. [3] 43, 475, '92.)

RUBIDIUM NITRATE RbNO₃. SOLUBILITY IN WATER.

(Berkeley — Trans. Roy. Soc. (Lond.) 203 A, 207, '04.)

| t°. | Mols. RbNO ₃ Per Liter. | Grams RbNO ₃ per 100 Gms. | | t°. | Mols. RbNO ₃ Per Liter. | Gms. RbNO ₃ per 100 Gms. | |
|-----|------------------------------------|--------------------------------------|-----------|-------|------------------------------------|-------------------------------------|-----------|
| | | Water. | Solution. | | | Water. | Solution. |
| 0 | 1.27 | 19.5 | 16.3 | 60 | 7.99 | 200 | 66.7 |
| 10 | 2.04 | 33.0 | 24.8 | 70 | 9.02 | 251 | 71.5 |
| 20 | 3.10 | 53.3 | 34.6 | 80 | 9.93 | 309 | 75.6 |
| 30 | 4.34 | 81.3 | 44.8 | 90 | 10.77 | 375 | 78.9 |
| 40 | 5.68 | 116.7 | 53.9 | 100 | 11.54 | 452 | 81.9 |
| 50 | 6.88 | 155.6 | 60.9 | 118.3 | 12.76 | 617 | 86.1 |

RUBIDIUM PERMANGANATE RbMnO₄.

One liter of aqueous solution contains 6.03 grams RbMnO₄ at 7°.

(Muthmann and Kuntze — Z. Kryst. Min. 23, 377, '94.)

100 cc. sat. aq. solution contain 0.46 gm. RbMnO₄ at 2°, 1.06 gms. at 19° and 4.68 gms. at 60°.

(Patterson — J. Am. Ch. Soc. 28, 1735, '06.)

RUBIDIUM SELENATE Rb₂SeO₄.

100 grams H₂O dissolve 158.9 grams Rb₂SeO₄ at 12°.

(Tutton — J. Ch. Soc. 71, 850, '97.)

RUBIDIUM FLUO SILICATE Rb₂SiF₆.

100 gms. H₂O dissolve 0.16 gm. Rb₂SiF₆ at 0°, and 1.36 gms. at 100°.

(Stolba — J. pr. Ch. 101, 1, '67.)

RUBIDIUM SILICO TUNGSTATE Rb₃SiW₁₂O₄₂.

100 gms. H₂O dissolve 0.65 gm. Rb₃SiW₁₂O₄₂ at 20°, and 5.1 gms. at 100°.

(Godeffroy — Ber. 9, 1363, '76.)

RUBIDIUM SULPHATE Rb₂SO₄. SOLUBILITY IN WATER.

(Etard — Ann. chim. phys. [7] 2, 550, '94; Berkeley — Trans. Roy. Soc. (Lond.) 203 A, 207, '04.)

| t°. | Mols. Rb ₂ SO ₄ per Liter. | Gms. Rb ₂ SO ₄ per 100 Gms. | | t°. | Mols. Rb ₂ SO ₄ per Liter. | Gms. Rb ₂ SO ₄ per 100 Gms. | |
|-----|--|---|-----------|-------|--|---|-----------|
| | | Water. | Solution. | | | Water. | Solution. |
| 0 | 1.27 | 36.4 | 27.3 | 60 | 2.15 | 67.4 | 40.3 |
| 10 | 1.46 | 42.6 | 29.9 | 70 | 2.25 | 71.4 | 41.7 |
| 20 | 1.64 | 48.2 | 32.5 | 80 | 2.34 | 75.0 | 42.9 |
| 30 | 1.79 | 53.5 | 34.9 | 90 | 2.42 | 78.7 | 44.0 |
| 40 | 1.92 | 58.5 | 36.9 | 100 | 2.49 | 81.8 | 45.0 |
| 50 | 2.04 | 63.1 | 38.7 | 102.4 | 2.50 | 82.6 | 45.2 |

SOLUBILITY OF RUBIDIUM DOUBLE SULPHATES IN WATER AT 25°.

(Locke — Am. Ch. J. 27, 459, '01.)

| Formula. | Per 100 cc. H ₂ O. | | Formula. | Per 100 cc. H ₂ O. | |
|--|-------------------------------|-------------|--|-------------------------------|-------------|
| | Gms. Anh. Salt. | Mols. Salt. | | Gms. Anh. Salt. | Mols. Salt. |
| Rb ₂ Cd(SO ₄) ₂ .6H ₂ O | 76.7 | 0.1615 | Rb ₂ Mn(SO ₄) ₂ .6H ₂ O | 35.7 | 0.0857 |
| Rb ₂ Co(SO ₄) ₂ .6H ₂ O | 9.28 | 0.022 | Rb ₂ Mg(SO ₄) ₂ .6H ₂ O | 20.2 | 0.0521 |
| Rb ₂ Cu(SO ₄) ₂ .6H ₂ O | 10.28 | 0.0241 | Rb ₂ Ni(SO ₄) ₂ .6H ₂ O | 5.98 | 0.0142 |
| Rb ₂ Fe(SO ₄) ₂ .6H ₂ O | 24.28 | 0.0579 | Rb ₂ Zn(SO ₄) ₂ .6H ₂ O | 10.10 | 0.0236 |

SALICYLIC ACID C₆H₄.OH.COOH 1:2.

SOLUBILITY IN WATER.

(Average curve from the closely agreeing determinations of Walker and Wood — J. Ch. Soc. 73, 620, '08; at 26.4°, Philip — *Ibid.* 87, 902, '05; at 25°, Paul — Z. physik. Ch. 14, 111, '94; at 20°, Hoitsema — *Ibid.* 27, 315, '08; Hoffmann and Langbeck — *Ibid.* 51, 400, '05. For determinations not in good agreement with the following, see Alexejew — Ann. Physik. Chem. 28, 305, '86; Bourignon — Ann. chim. phys. [5] 15, 165, '78; Ost. — J. pr. Ch. [2] 17, 232, '78.)

| t°. | Gms. C ₆ H ₄ OHCOOH per Liter Solution. | t°. | Gms. C ₆ H ₄ OHCOOH per Liter Solution. | t°. | Gms. C ₆ H ₄ OHCOOH per Liter Solution. |
|-----|---|-----|---|-----|---|
| 0 | 0.8 | 25 | 2.2 | 60 | 8.2 |
| 10 | 1.2 | 30 | 2.7 | 70 | 13.2 |
| 20 | 1.8 | 40 | 3.7 | 80 | 20.5 |
| | | 50 | 5.4 | | |

SOLUBILITY OF SALICYLIC ACID (LIQUID) IN WATER.

(Alexejew.)

Determinations by Synthetic Method. See Note, page 9. Figures read from curve.

| t°. | Gms. C ₆ H ₄ OHCOOH per 100 Gms. | |
|------------------|--|-----------------------|
| | Aqueous Layer. | Salicylic Acid Layer. |
| 60 | 7 | 68 |
| 70 | 8 | 64 |
| 80 | 12 | 58 |
| 90 | 19 | 49 |
| 95 (crit. temp.) | | 32 |

SOLUBILITY OF SALICYLIC ACID IN AQUEOUS SALT SOLUTIONS AT 25°

AND AT 35°.

(Hoffmann and Langbeck — Z. physik. Ch. 51, 407, '05.)

| Salt. | Normality of Salt Solution. | Gms. Salt per Liter. | C ₆ H ₄ OHCOOH per Liter at 25°. | | | C ₆ H ₄ OH.COOH per Liter at 35°. | |
|------------------|-----------------------------|----------------------|--|---------------------------|---|---|---------------------------|
| | | | Grams. | G. Mols. | | Grams. | G. Mols. |
| KCl | 0.020 | 1.49 | 2.24 | 2.9216 · 10 ⁻⁴ | | 3.23 | 4.2206 · 10 ⁻⁴ |
| " | 0.100 | 7.46 | 2.25 | 2.9377 | " | 3.23 | 4.2203 |
| " | 0.492 | 36.73 | 2.02 | 2.6321 | " | 3.01 | 3.9268 |
| " | 1.004 | 74.92 | 1.89 | 2.4759 | " | 2.68 | 3.5003 |
| KNO ₃ | 0.020 | 2.02 | 2.25 | 3.9351 | " | 3.25 | 4.2499 |
| " | 0.100 | 10.12 | 2.30 | 3.0103 | " | 3.32 | 4.3334 |
| " | 0.504 | 51.10 | 2.38 | 3.1061 | " | 3.38 | 4.4123 |
| " | 1.004 | 101.60 | 2.39 | 3.1249 | " | 3.36 | 4.3848 |
| NaCl | 0.020 | 1.19 | 2.23 | 2.9110 | " | 3.22 | 4.2062 |
| " | 0.100 | 5.95 | 2.22 | 2.9027 | " | 3.20 | 4.1806 |
| " | 0.497 | 29.50 | 2.00 | 2.6128 | " | 2.85 | 3.7171 |
| " | 0.988 | 58.80 | 1.72 | 2.2487 | " | 2.43 | 3.1596 |

SOLUBILITY OF SALICYLIC ACID IN AQUEOUS SOLUTIONS OF SODIUM FORMATE, ACETATE, AND BUTYRATE AT 26.4°.

(Philip — J. Ch. Soc. 87, 992, '05.)

| $\frac{\text{Mols. Na Salt}}{100}$ per Liter. | $\frac{\text{Mols. C}_6\text{H}_4\text{OH.COOH}}{100}$ per Liter in: | | | $\frac{\text{Gms. Na Salt}}{\text{per Liter.}}$ | $\text{Gms. C}_6\text{H}_4\text{OH.COOH}$ per Liter in: | | |
|--|--|------------------------|--------------------------------------|---|---|------------------------|--------------------------------------|
| | HCOONa. | CH ₃ COONa. | C ₃ H ₇ COONa. | | HCOONa. | CH ₃ COONa. | C ₃ H ₇ COONa. |
| 0 | 1.71 | 1.71 | 1.71 | 0 | 2.36 | 2.36 | 2.36 |
| 1 | 2.35 | 2.47 | 2.50 | 1 | 3.7 | 3.6 | 3.3 |
| 2 | 3.05 | 3.35 | 3.48 | 2 | 5.0 | 5.2 | 4.5 |
| 3 | 3.7 | 4.2 | 4.35 | 3 | 6.2 | 6.75 | 5.65 |
| 4 | 4.3 | 5.1 | 5.3 | 4 | 7.2 | 8.3 | 6.85 |
| 5 | 4.8 | 6.1 | 6.3 | 5 | ... | ... | 8.1 |

SOLUBILITY OF SALICYLIC ACID IN AQUEOUS SOLUTIONS OF SODIUM SALICYLATE AT 20.1°.

(Hoitsema — Z. physik. Ch. 27, 305, '98.)

| $\frac{\text{Gram Mols. per Liter.}}{\text{C}_6\text{H}_4\text{OH COOH. C}_6\text{H}_4\text{OH COONa.}}$ | | Sp. Gr. of Solutions. | $\frac{\text{Grams per Liter.}}{\text{C}_6\text{H}_4\text{OH COOH. C}_6\text{H}_4\text{OH COONa.}}$ | | Solid Phase. |
|--|-------|-----------------------------|---|-------|--|
| | | | | | |
| 0.0132 | 0.0 | 1.002 | 1.823 | 0.0 | C ₆ H ₄ OHCOOH |
| 0.0112 | 0.017 | 1.003 | 1.55 | 2.705 | " |
| 0.0124 | 0.113 | 1.009 | 1.71 | 17.98 | " |
| 0.0143 | 0.226 | 1.016 | 1.97 | 35.96 | " |
| 0.0164 | 0.344 | 1.024 | 2.26 | 54.74 | " |
| 0.0203 | 0.500 | 1.034 | 2.80 | 79.56 | " |
| 0.062 | 1.70 | 1.098 | 8.56 | 270.5 | " |
| 0.095 | 2.11 | 1.137 | 13.11 | 335.7 | { C ₆ H ₄ OHCOOH.C ₆ H ₄ OHCOONa + C ₆ H ₄ OHCOOH C ₆ H ₄ OHCOOH.C ₆ H ₄ OHCOONa |
| 0.091 | 2.19 | 1.144 | 12.56 | 348.4 | |
| 0.086 | 3.41 | 1.215 | 11.88 | 542.6 | |
| 0.081 | 4.23 | 1.263 | 11.19 | 673.0 | { C ₆ H ₄ OHCOOH.C ₆ H ₄ OHCOONa + C ₆ H ₄ OHCOONa |
| 0.048 | 4.18 | 1.259 | 6.63 | 665.1 | |
| 0.021 | 4.12 | 1.258 | 2.90 | 665.5 | " |
| 0.00 | 4.15 | 1.257 | 0.0 | 660.3 | " |

SOLUBILITY OF SALICYLIC ACID IN ALCOHOLS IN ETHER AND IN ACETONE.

(Timofiew — Compt. rend. 112, 1137, '91; at 15°, Bourgoin — Ann. chim. phys. [5] 13, 405, '78; at 23°, Walker and Wood — J. Ch. Soc. 73, 620, '98.)

| Solvent. | t°. | $\frac{\text{Gms. C}_6\text{H}_4\text{OHCOOH}}{\text{per 100 Gms.}}$ | | Solvent. | t°. | $\frac{\text{Gms. C}_6\text{H}_4\text{OHCOOH}}{\text{per 100 Gms.}}$ | |
|--------------------------------------|-----|--|-----------|-------------------------------------|-----|--|-----------|
| | | Solvent. | Solution. | | | Solvent. | Solution. |
| CH ₃ OH | -3 | 40.67 | 28.91 | C ₂ H ₅ OH(n) | -3 | 26.12 | 20.71 |
| CH ₃ OH | +21 | 62.48 | 38.46 | C ₂ H ₅ OH(n) | +21 | 37.69 | 27.36 |
| C ₂ H ₅ OH | -3 | 36.12 | 26.29 | (CH ₃) ₂ O | 15 | 50.47 | 33.55 |
| C ₂ H ₅ OH | +15 | 49.63 | 33.17 | (CH ₃) ₂ O | 17 | 30.5 | 23.4 |
| C ₂ H ₅ OH | 21 | 53.53 | 34.87 | (CH ₃) ₂ CO | 23 | 45.5 | 31.3 |
| C ₂ H ₅ OH 90% | 15 | 42.09 | 29.62 | | | | |

SOLUBILITY OF SALICYLIC ACID IN AQUEOUS SOLUTIONS OF ETHYL ALCOHOL, ISO BUTYL ALCOHOL, DEXTROSE, CANE SUGAR, AND OF LEVULOSE AT 25° AND AT 35°.

(Hoffmann and Langbeck — Z. physik. Ch. 51, 400, '05.)

| Aq. Solvent. | Conc. of Solvent. | | C ₆ H ₄ OHCOOH per Liter at 25°. | | C ₆ H ₄ OHCOOH per Liter at 35°. | |
|---|-------------------|-----------------|--|--------|--|--------|
| | Normality. | Gms. per Liter. | G. Mols. | Grams. | G. Mols. | Grams. |
| C ₂ H ₅ OH | 0.0249 | 1.146 | 2.8966.10 ⁻⁴ | 0.222 | 4.2044.10 ⁻⁴ | 0.322 |
| " | 0.0560 | 2.578 | 2.9150 " | 0.223 | 4.2348 " | 0.324 |
| " | 0.1747 | 8.04 | 2.9901 " | 0.229 | ... | ... |
| " | 0.2399 | 11.05 | ... | ... | 4.4341 " | 0.339 |
| " | 1.03 | 47.4 | 3.5279 " | 0.270 | 5.2816 " | 0.404 |
| " | 1.638 | 75.44 | 3.9253 " | 0.300 | ... | ... |
| C ₄ H ₉ OH (iso) | 0.020 | 1.496 | 2.909 " | 0.223 | 4.229 " | 0.324 |
| " | 0.051 | 3.74 | 2.955 " | 0.226 | 4.289 " | 0.329 |
| " | 0.100 | 7.48 | 3.033 " | 0.232 | 4.435 " | 0.339 |
| " | 0.521 | 38.60 | 3.718 " | 0.285 | 5.624 " | 0.431 |
| C ₆ H ₁₂ O ₆ | 0.02 | 3.6 | 2.886 " | 0.221 | 4.184 " | 0.321 |
| " | 0.10 | 18.0 | 2.898 " | 0.222 | 4.202 " | 0.322 |
| " | 0.50 | 89.6 | 2.954 " | 0.226 | 4.263 " | 0.326 |
| " | 1.00 | 180.0 | 3.015 " | 0.231 | 4.360 " | 0.334 |
| C ₁₂ H ₂₂ O ₁₁ | 0.02 | 6.88 | 2.885 " | 0.221 | 4.206 " | 0.322 |
| " | 0.10 | 34.97 | 2.964 " | 0.227 | 4.287 " | 0.328 |
| " | 0.50 | 172.0 | 3.239 " | 0.248 | 4.697 " | 0.360 |
| " | 1.10 | 376.3 | 3.633 " | 0.278 | 5.236 " | 0.401 |
| C ₆ H ₁₂ O ₆ | 0.02 | 3.6 | 2.888 " | 0.221 | ... | ... |
| " | 0.06 | 10.8 | 2.895 " | 0.221 | ... | ... |
| " | 0.25 | 45.0 | 2.944 " | 0.225 | ... | ... |

SOLUBILITY OF SALICYLIC ACID IN BENZENE.

(Walker and Wood — J. Ch. Soc. 73, 620, '98.)

| t°. | Gms. C ₆ H ₄ OHCOOH per 100 Gms. C ₆ H ₆ . | t°. | Gms. C ₆ H ₄ OHCOOH per 100 Gms. C ₆ H ₆ . | t°. | Gms. C ₆ H ₄ OHCOOH per 100 Gms. C ₆ H ₆ . |
|------|--|------|--|------|--|
| 11.7 | 0.460 | 30.2 | 0.991 | 49.4 | 2.380 |
| 18.2 | 0.579 | 34.6 | 1.261 | 64.2 | 4.40 |
| | | 36.6 | 1.430 | | |

SELENIUM Se.

SOLUBILITY IN CARBON BISULPHIDE.

(Marc — Z. anorg. Ch. 48, 425, '06.)

100 cc. CS₂ dissolve 0.065 gm. amorphous Se at room temperature. Se which is heated to 180° for 6–7 hours is insoluble in CS₂. Se crystallized from the melt at 200° is insoluble in CS₂. Se heated once quickly to 140° is very slightly soluble in CS₂.

100 gms. methylene iodide (CH₂I₂) dissolve 1.3 gms. Se at 12°.

(Retgers — Z. anorg. Ch. 3, 346, '93.)

SELENIOUS ACID H_2SeO_3 .**SOLUBILITY IN WATER.**

(Etard — Ann. chim. phys. [7] 2, 551, '94.)

| t°. | Gms. H_2SeO_3 per 100 Gms. Solution. | t°. | Gms. H_2SeO_3 per 100 Gms. Solution. | t°. | Gms. H_2SeO_3 per 100 Gms. Solution. |
|-----|---|-----|---|-----|---|
| -10 | 42.2 | 25 | 67.0 | 60 | 79.3 |
| 0 | 47.4 | 30 | 70.2 | 70 | 79.3 |
| +10 | 55.0 | 40 | 77.5 | 80 | 79.3 |
| 20 | 62.5 | 50 | 79.2 | 90 | 79.4 |

SENFÖL $\text{CS}:\text{NC}_3\text{H}_5$. Mustard Oil. Allyl-Iso Sulphocyanic Ester.**SOLUBILITY IN SULPHUR.**

Determined by Synthetic Method. See Note, page 9.

(Alexejew — Ann. Physik. Ch. 28, 305, '86.)

| t°. | Grams Senföl per 100 Gms. | |
|-------------------|---------------------------|------------------|
| | Sulphur Layer. | Senföl Layer. |
| 90 | 10 | 72 |
| 100 | 12 | 67 |
| 110 | 15 | 62 |
| 120 | 23 | 51 |
| 124 (crit. temp.) | 35 | |

SILICON Si.**SOLUBILITY IN LEAD AND IN ZINC.**

(Moissan and Siemens — Ber. 37, 2088, '04.)

| In Lead. | | In Zinc. | |
|----------|-----------------------------------|----------|-----------------------------------|
| t°. | Gms. Si per 100 Gms. Solution. | t°. | Gms. Si per 100 Gms. Solution. |
| 1250 | 0.024 | 600 | 0.06 |
| 1330 | 0.070 | 650 | 0.15 |
| 1400 | 0.150 | 730 | 0.57 |
| 1450 | 0.210 | 800 | 0.92 |
| 1550 | 0.780 | 850 | 1.62 |

SILICON IODIDES Si_2I_6 , SiI_4 .**SOLUBILITY IN CARBON BISULPHIDE.**

(Friedel and Lachburg — Bull. soc. chim. [2] 12, 92, '69; Friedel — Liebig's Ann. 149, 96, '69.)

100 gms. CS_2 dissolve 19 gms. Si_2I_6 at 19°.
 100 gms. CS_2 dissolve 26 gms. Si_2I_6 at 27°.
 100 gms. CS_2 dissolve 2.2 gms. SiI_4 at 27°.

SILICO TUNGSTIC ACID $\text{H}_8\text{SiW}_{12}\text{O}_{42}$.

100 gms. H_2O dissolve 961.5 crystallized silico tungstic acid at 18°,
 and solution has Sp. Gr. 2.843.

For equilibrium between metallic *Silver* and mercury (Silver amalgam) and mixed aqueous solutions of their nitrates, determined for mixtures of the two metals in all proportions, see Reinders — *Z. physik. Ch.* 54, 609, '06.

SILVER ACETATE CH_3COOAg .

SOLUBILITY IN WATER.

(Nernst — *Z. physik. Ch.* 4, 379, '89; Arrhenius — *Ibid.* 11, 396, '93; Goldschmidt — *Ibid.* 25, 93, '98; Nauman and Rucker — *Ber.* 38, 2203, '05; Raupenstrauch — *Monatsh. Ch.* 6, 585, '85; Wright and Thompson — *Phil. Mag.* [5] 17, 288, '84; 19, 1, '85.)

| t°. | Gms. Ag($\text{C}_2\text{H}_3\text{O}_2$) per Liter. | t°. | Gms. Ag($\text{C}_2\text{H}_3\text{O}_2$) per Liter. | t°. | Gms. Ag($\text{C}_2\text{H}_3\text{O}_2$) per Liter. |
|-----|---|-----|---|-----|---|
| 0 | 7.22 | 25 | 11.2 | 50 | 16.4 |
| 10 | 8.75 | 30 | 12.1 | 60 | 18.9 |
| 15 | 9.4 | 40 | 14.1 | 70 | 21.8 |
| 20 | 10.4 | | | 80 | 25.2 |

SOLUBILITY OF SILVER ACETATE IN AQUEOUS SOLUTIONS OF:

| Silver Nitrate. | | | Sodium Acetate. | | |
|------------------------------------|--|--------------------|--|--|-------------|
| Gms. AgNO_3 per Liter. | Gms. CH_3COOAg per Liter at: | | Gms. CH_3COONa per Liter. | Gms. CH_3COOHg per Liter at: | |
| | 16° (Nernst). | 19.8° (Arrhenius). | | 16° (N., N. and R.). | 18.6° (A.). |
| 0 | 10.05 | 9.85 | 0 | 10.05 | 9.9 |
| 5 | 8.2 | 7.9 | 5 | 6.3 | 6.6 |
| 10 | 7.0 | 6.6 | 10 | 4.6 | 4.9 |
| 15 | 6.4 | 5.5 | 15 | 3.8 | 4.1 |
| 20 | 5.7 | 4.5 | 20 | 3.3 | 3.5 |
| 30 | 4.4 | ... | 30 | ... | 2.8 |
| 40 | 3.2 | ... | 40 | ... | 2.4 |

SILVER Mono Chlor ACETATE $\text{CH}_2\text{ClCOOAg}$.

One liter aqueous solution contains 12.97 grams $\text{CH}_2\text{ClCOOAg}$ at 16.9°.

(Arrhenius.)

SOLUBILITY OF SILVER MONO CHLOR ACETATE AT 16.9° IN AQUEOUS SOLUTIONS OF:

| Silver Nitrate. | | Sodium Chlor Acetate. | |
|------------------------------------|--|--|--|
| Gms. AgNO_3 per Liter. | Gms. $\text{CH}_2\text{ClCOOAg}$ per Liter. | Gms. $\text{CH}_2\text{ClCOONa}$ per Liter. | Gms. $\text{CH}_2\text{ClCOOAg}$ per Liter. |
| 0.0 | 12.97 | 0.0 | 12.97 |
| 9.6 | 10.05 | 3.88 | 10.05 |
| 17.0 | 7.55 | 7.77 | 8.16 |
| | | 15.53 | 6.02 |
| | | 31.07 | 4.19 |
| | | 58.26 | 3.26 |

SILVER Di Propyl ACETATE $\text{AgC}_6\text{H}_{13}\text{O}_2$.

100 gms. H_2O dissolve 0.123 gm. $\text{AgC}_6\text{H}_{13}\text{O}_2$ at 11.7°, and 0.190 gm. at 72°.

(Fürth — *Monatsh. Ch.* 9, 311, '88.)

SILVER Methyl Ethyl ACETATE $\text{Ag} \cdot \text{CH}_3 \cdot \text{CH}_2 \cdot \text{CH}(\text{CH}_3) \cdot \text{COO}$.

SILVER Di Ethyl ACETATE $\text{Ag} \cdot [(\text{C}_2\text{H}_5)_2\text{CH} \cdot \text{COO}]$.

SILVER Tri Methyl ACETATE $\text{Ag} \cdot (\text{CH}_3)_3\text{CCOO} \cdot *$

SOLUBILITY OF EACH WATER.

(Sedlitzky — *Monatsh. Ch.* 8, 563, '87; Keppish — *Ibid.* 9, 589, '88; Stiasny — *Ibid.* 12, 601, '91.)

| t°. | Gms. per 100 Gms. H ₂ O. | | | t°. | Gms. per 100 Gms. H ₂ O. | | |
|-----|--|--|--|-----|--|--|--|
| | $\text{Ag} \cdot \text{C}_2\text{H}_3\text{O}_2$ | $\text{Ag} \cdot \text{C}_2\text{H}_5\text{O}_2$ | $\text{Ag} \cdot \text{C}_2\text{H}_5\text{O}_2 \cdot *$ | | $\text{Ag} \cdot \text{C}_2\text{H}_3\text{O}_2$ | $\text{Ag} \cdot \text{C}_2\text{H}_5\text{O}_2$ | $\text{Ag} \cdot \text{C}_2\text{H}_5\text{O}_2 \cdot *$ |
| 0 | 1.112 | 0.402 | 1.10 | 50 | 1.602 | 0.536 | 1.47 |
| 10 | 1.126 | 0.413 | 1.15 | 60 | 1.827 | 0.585 | 1.57 |
| 20 | 1.182 | 0.432 | 1.22 | 70 | 2.093 | 0.643 | 1.68 |
| 30 | 1.280 | 0.458 | 1.22 | 80 | 2.402 | ... | 1.80 |
| 40 | 1.420 | 0.494 | 1.37 | | | | |

SILVER BENZOATE $\text{C}_6\text{H}_5\text{COOAg}$.

One liter of aqueous solution contains 1.763 gms. $\text{C}_6\text{H}_5\text{COOAg}$ at 14.5°, and 2.607 gms. at 25°.

(Holleman — *Z. physik. Ch.* 12, 129, '93; Noyes and Schwartz — *Ibid.* 27, 287, '98.)

SOLUBILITY OF SILVER BENZOATE AT 25° IN AQUEOUS SOLUTIONS OF:

| Nitric Acid (N. and S.). | | | | Chlor Acetic Acid (N. and S.). | | | |
|--------------------------|------------------------------------|------------------|------------------------------------|--------------------------------|------------------------------------|----------------------------|------------------------------------|
| Millimols per Liter. | | Grams per Liter. | | Millimols per Liter. | | Grams per Liter. | |
| HNO_3 | $\text{C}_6\text{H}_5\text{COOAg}$ | HNO_3 | $\text{C}_6\text{H}_5\text{COOAg}$ | CH_2ClCOOH | $\text{C}_6\text{H}_5\text{COOAg}$ | CH_2ClCOOH | $\text{C}_6\text{H}_5\text{COOAg}$ |
| 0.0 | 0.01144 | 0.0 | 2.607 | 0.0 | 0.01144 | 0.0 | 2.607 |
| 0.004435 | 0.01395 | 0.280 | 3.195 | 0.00394 | 0.01385 | 0.371 | 3.172 |
| 0.00887 | 0.01698 | 0.559 | 3.889 | 0.00787 | 0.01612 | 0.744 | 3.691 |
| 0.00892 | 0.01715 | 0.562 | 3.926 | 0.01574 | 0.02093 | 1.487 | 4.792 |
| 0.01774 | 0.02324 | 1.118 | 5.321 | | | | |
| 0.02674 | 0.03071 | 1.686 | 7.031 | | | | |

One liter of cold alcohol dissolves 0.169 gm. $\text{C}_6\text{H}_5\text{COOAg}$; one liter of boiling alcohol dissolves 0.465 gram.

(Liebermann — *Ber.* 35, 1094, '02.)

SILVER BORATE AgBO_3 .

One liter of aqueous solution contains about 9.05 gms. AgBO_3 at 25°.

(Abegg and Cox — *Z. physik. Ch.* 46, 11, '03.)

SILVER BROMATE AgBrO_3 .

SOLUBILITY IN WATER.

| t°. | Gms. AgBrO_3 per Liter. | Authority. |
|------|----------------------------------|---|
| 20 | 1.586 | (Böttger — <i>Z. physik. Ch.</i> 46, 602, '03.) |
| 24.5 | 1.911 | (Noyes — <i>Z. physik. Ch.</i> 6, 246, '90.) |
| 25 | 1.68 | (Longi — <i>Gazz. chim. ital.</i> 13, 87, '83.) |

SOLUBILITY OF SILVER BROMATE IN AQUEOUS AMMONIA AND NITRIC ACID SOLUTIONS AT 25°.

(Longi.)

| Solvent. | Sp. Gr. | Grams AgBrO_3 per | |
|-------------|------------|----------------------------|----------------|
| | | 1000 cc. Sol. | 1000 Gms. Sol. |
| Ammonia | 0.998 = 5% | 35.10 | 35.54 |
| Ammonia | 0.96 = 10% | 443.6 | 462.5 |
| Nitric Acid | 1.21 = 35% | 3.81 | 3.12 |

SOLUBILITY OF SILVER BROMATE AT 24.5° IN AQUEOUS SOLUTIONS OF:

| Silver Nitrate (Noyes). | | | | Potassium Bromate (N.). | | | |
|-------------------------|----------------------|---------------------|----------------------|-------------------------|----------------------|---------------------|----------------------|
| Normal Content. | | Gms. per Liter. | | Normal Content. | | Gms. per Liter. | |
| AgNO ₃ . | AgBrO ₃ . | AgNO ₃ . | AgBrO ₃ . | KBrO ₃ . | AgBrO ₃ . | KBrO ₃ . | AgBrO ₃ . |
| 0.0 | 0.0081 | 0.0 | 1.911 | 0.0 | 0.0081 | 0.0 | 1.911 |
| 0.0085 | 0.0051 | 1.445 | 1.203 | 0.0085 | 0.00519 | 1.42 | 1.225 |
| 0.0346 | 0.0022 | 5.882 | 0.510 | 0.0346 | 0.00227 | 5.78 | 0.536 |

SILVER BROMIDE AgBr.

SOLUBILITY IN WATER.

| t°. | Gms. AgBr per Liter. | Authority. |
|-----|----------------------|---|
| 20 | 0.000084 | (Böttger — Z. physik. Ch. 46, 602, '03.) |
| 25 | 0.000137 | (Abegg and Cox — Z. physik. Ch. 46, 11, '03.) |
| 100 | 0.00370 | (Böttger — Z. physik. Ch. 56, 93, '06.) |

(See also Holleman — Z. physik. Ch. 12, 129, '93; Kohlrausch — *Ibid.* 50, 365, '05.)

SOLUBILITY OF SILVER BROMIDE IN AQUEOUS AMMONIA SOLUTIONS.

(Longi — Gazz. chim. ital. 13, 87, '83; at 80°, Pohl — Sitzber. Akad. Wiss. Wien, 41, 267, '60.)

| Solvent. | Gms. AgBr at 12° per | | Gms. AgBr at 80° per |
|----------------------------|----------------------|--------------------|----------------------|
| | 1000 cc. Solvent. | 1000 Gms. Solvent. | 1000 Gms. Solvent. |
| Ammonia Sp. Gr. 0.998 = 5% | 0.114 | 0.114 | ... |
| Ammonia Sp. Gr. 0.96 = 10% | 3.33-4.0 | 3.47 | ... |
| Ammonia Sp. Gr. 0.986 | ... | ... | 0.51* 1.0† |

* Dried AgBr. † Freshly pptd.

SOLUBILITY OF SILVER BROMIDE IN AQUEOUS SOLUTIONS OF:
Ammonia at 0°. Mono Methyl Amine at 11.5°.

(Jarry — Ann. chim. phys. [7] 17, 363, '99.)

(Jarry.)

| Grams per 100 cc. Solution. | | | | Gms. per 100 cc. Solution. | |
|-----------------------------|-------|----------------------|-------|-----------------------------------|-------|
| NH ₃ Gas. | AgBr. | NH ₃ Gas. | AgBr. | NH ₂ CH ₃ . | AgBr. |
| 3.07 | 0.080 | 26.27 | 1.067 | 11.01 | 0.07 |
| 4.88 | 0.096 | 31.26 | 1.568 | 13.17 | 0.12 |
| 6.69 | 0.172 | 33.89 | 1.987 | 15.13 | 0.16 |
| 8.29 | 0.212 | 36.52 | 2.669 | 17.97 | 0.28 |
| 11.51 | 0.349 | 37.22 | 2.888 | 32.58 | 0.55 |
| 15.32 | 0.557 | 37.70 | 2.930 | 35.62 | 0.73 |
| 18.09 | 0.722 | 39.26 | 2.892 | 43.11 | 1.27 |
| 19.53 | 0.741 | 39.95 | 2.852 | 48.44 | 2.89 |

SOLUBILITY OF SILVER BROMIDE IN AQUEOUS SOLUTIONS OF
SODIUM THIO SULPHATE AT 35°.

(Richards and Faber — Am. Ch. J. 21, 186, '99.)

| Gms. Cryst. Na Thio Sulphate per Liter. | Gms. AgBr Dissolved per Gram of Thio Sulphate. | Mols. AgBr Dissolved per Mol. of Na ₂ S ₂ O ₃ . |
|---|--|--|
| 100 | 0.376 | 0.496 |
| 200 | 0.390 | 0.515 |
| 300 | 0.397 | 0.524 |
| 400 | 0.427 | 0.564 |

SOLUBILITY OF SILVER BROMIDE IN AQUEOUS SALT SOLUTIONS.

(Valenta — *Monatsh. Ch.* 15, 250, '94; see also Cohn — *Z. physik. Ch.* 18, 61, '95.)

| Salt Solution. | t°. | Gms. AgBr per 100 Gms. Aq. Solution of Concentration: | | | | |
|-------------------------|-----|---|---------|----------|----------|----------|
| | | 1: 100. | 5: 100. | 10: 100. | 15: 100. | 20: 100. |
| Sodium Thio Sulphate | 20 | 0.35 | 1.90 | 3.50 | 4.20 | 5.80 |
| " " Calc. by Cohn | 20 | 0.50 | 2.40 | 4.59 | 6.58 | 8.40 |
| Sodium Sulphite | 25 | ... | ... | 0.04 | ... | 0.08 |
| Potassium Cyanide | 25 | ... | 6.55 | ... | ... | ... |
| " " Calc. by Cohn | 25 | ... | 6.85 | ... | ... | ... |
| Potassium Sulphocyanide | 25 | ... | ... | 0.73 | ... | ... |
| Ammonium Sulphocyanide | 20 | ... | 0.21 | 2.04 | 5.30 | ... |
| Calcium Sulphocyanide | 25 | ... | ... | 0.53 | ... | ... |
| Barium Sulphocyanide | 25 | ... | ... | 0.35 | ... | ... |
| Aluminum Sulphocyanide | 25 | ... | ... | 4.50 | ... | ... |
| Thio Carbamide | 25 | ... | ... | 1.87 | ... | ... |
| Thio Cyanime | 25 | 0.08 | 0.35 | 0.72 | ... | ... |

NOTE. — Cohn shows that the lower results obtained by Valenta are due to the excess of solid AgBr used and the consequent formation of the less soluble di salt $3(\text{AgS}_2\text{O}_3\text{Na})_2$, instead of the more soluble salt $(\text{AgS}_2\text{O}_3\text{Na})_2\text{Na}_2\text{S}_2\text{O}_3$.

100 cc. H_2O containing 10 per cent of normal mercuric acetate, $\text{Hg}(\text{C}_2\text{H}_3\text{O}_2)_2 + \text{Aq.}$, dissolve 0.0122 gram AgBr at 20°.

100 gms. NaCl in conc. aq. solution dissolve 0.474 gm. AgBr at 15°.

100 gms. NaCl in 21 per cent solution dissolve 0.182 gm. AgBr at 15°.

100 gms. KBr in conc. solution dissolve 3.019 gms. AgBr at 15°.

95 gms. NaCl + 10 gms. KBr in conc. aq. solution dissolve 0.075 gm. AgBr at 15°.

(Schierholz — *Sitzber. K. Akad. Wiss. (Vienna)* 101, 2b, 4, '90.)

SILVER BUTYRATE $\text{C}_3\text{H}_7\text{COOAg}$.SILVER (Iso) BUTYRATE $(\text{CH}_3)_2\text{CHCOOAg}$.

SOLUBILITY OF EACH IN WATER.

(Goldschmidt — *Z. physik. Ch.* 25, 93, '98; Arrhenius — *Ibid.* 11, 396, '93; Raupenstrauch — *Monatsh. Ch.* 6, 589, '85.)

| t°. | Gms. per 100 Grams H_2O . | | t°. | Grams per 100 Gms. H_2O . | |
|------|---|---------------|-----|---|---------------|
| | Butyrate. | Iso Butyrate. | | Butyrate. | Iso Butyrate. |
| 0 | 0.363 | 0.796 | 30 | 0.561 (1.102 G.) | 1.060 |
| 10 | 0.419 | 0.874 | 40 | 0.647 | ... |
| 17.8 | 0.432 (A.) | ... | 50 | 0.742 | 1.313 |
| 18.8 | 0.445 (A.) | ... | 60 | 0.848 | ... |
| 20 | 0.484 (0.999 G.) | 0.961 | 70 | 0.901 | 1.670 |
| 25 | ... (1.044 G.) | ... | 80 | 1.14 | 1.898 |

SILVER BUTYRATE

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SOLUBILITY OF SILVER BUTYRATE IN Aq. SOLUTIONS OF SILVER ACETATE, SILVER NITRATE AND OF SODIUM BUTYRATE.

(Arrhenius — Z. physik. Ch. 11, 396, '93.)

| In Silver Acetate at 17.8°. | | | | In Silver Nitrate at 18.8°. | | | |
|-----------------------------|-------------------------------------|----------------------------|-------------------------------------|-----------------------------|-------------------------------------|------------------|-------------------------------------|
| G. Mols. per Liter. | | Grams per Liter. | | G. Mols. per Liter. | | Grams per Liter. | |
| $\text{CH}_3\text{COOAg.}$ | $\text{C}_3\text{H}_7\text{COOAg.}$ | $\text{CH}_3\text{COOAg.}$ | $\text{C}_3\text{H}_7\text{COOAg.}$ | $\text{AgNO}_3.$ | $\text{C}_3\text{H}_7\text{COOAg.}$ | $\text{AgNO}_3.$ | $\text{C}_3\text{H}_7\text{COOAg.}$ |
| 0.0 | 0.0221 | 0.0 | 4.32 | 0.0 | 0.0228 | 0.0 | 4.445 |
| 0.0270 | 0.0139 | 4.51 | 2.71 | 0.0667 | 0.0078 | 11.33 | 1.521 |
| 0.0506 | 0.0103 | 8.45 | 2.01 | 0.100 | 0.0062 | 17.00 | 1.209 |

In Sodium Butyrate at 18.2°.

| G. Mols. per Liter. | | Grams per Liter. | | G. Mols. per Liter. | | Grams per Liter. | |
|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|
| $\text{C}_3\text{H}_7\text{COONa.}$ | $\text{C}_3\text{H}_7\text{COOAg.}$ | $\text{C}_3\text{H}_7\text{COONa.}$ | $\text{C}_3\text{H}_7\text{COOAg.}$ | $\text{C}_3\text{H}_7\text{COONa.}$ | $\text{C}_3\text{H}_7\text{COOAg.}$ | $\text{C}_3\text{H}_7\text{COONa.}$ | $\text{C}_3\text{H}_7\text{COOAg.}$ |
| 0.0 | 0.0224 | 0.0 | 4.363 | 0.0658 | 0.0091 | 7.24 | 1.774 |
| 0.0066 | 0.0199 | 0.73 | 3.881 | 0.1315 | 0.0060 | 14.47 | 1.170 |
| 0.0164 | 0.0169 | 1.81 | 3.296 | 0.263 | 0.0040 | 28.96 | 0.780 |
| 0.0329 | 0.0131 | 3.62 | 2.555 | 0.493 | 0.0027 | 54.28 | 0.526 |

SILVER CAPROATES $\text{Ag}(\text{C}_6\text{H}_{11}\text{O}_2).$

SOLUBILITY IN WATER.

(Keppisch — Monatsh. Ch. 9, 580, '88; Stiassny — *Ibid.* 12, 506, '91; Kulisch — *Ibid.* 14, 570, '93; König — *Ibid.* 15, 26, '94; Altschul — *Ibid.* 17, 568, '96.)

Results in terms of grams salt per 100 grams H_2O .

| t°. | Normal Caproate $\text{CH}_3(\text{CH}_2)_4\text{COOAg.}$ | 2 Methyl Pentan Acid $\text{CH}_3\text{CH}(\text{CH}_3)_2\text{COOAg.}$ | Methyl 3 Pentan Acid $\text{CH}_3\text{CH}_2\text{CH}_2\text{COOAg.}$ | 4 Methyl Pentan Acid $\text{CH}_3(\text{CH}_2)_2\text{CH}(\text{CH}_3)_2\text{COOAg.}$ |
|-----|--|---|---|--|
| 0 | 0.076 (A.) | 0.078 (Keppisch) | 0.168 (König) | 0.510 (Stiassny) |
| 10 | 0.085 | 0.089 | 0.162 | 0.528 |
| 20 | 0.100 | 0.107 | 0.163 | 0.550 |
| 30 | 0.123 | 0.131 | 0.170 | 0.574 |
| 40 | 0.154 | 0.161 | 0.183 | 0.602 |
| 50 | 0.193 | 0.198 | 0.203 | 0.632 |
| 60 | 0.240 | 0.243 | 0.229 | 0.666 |
| 70 | 0.295 | 0.288 | 0.263 | 0.702 |
| 80 | 0.354 | .. | 0.300 | 0.742 |
| 90 | ... | ... | 0.347 | ... |

SILVER CARBONATE $\text{Ag}_2\text{CO}_3.$

SOLUBILITY IN WATER.

| t°. | Gms. Ag_2CO_3 per Liter. | Authority. |
|-----|---|---|
| 15 | 0.031 | (Kremers — Pogg. Ann. 85, 248, '52.) |
| 25 | 0.033 (0.00012 gm. atoms Ag.) | (Abegg and Cox — Z. physik. Ch. 46, 11, '03.) |
| 100 | 0.50 | (Joulin — Ann. chim. phys. [4] 30, 260, '73.) |
| 15 | 0.85 (in H_2O sat. with CO_2) | (Johnson — Ch. News, 54, 75, '86.) |

SILVER CHLORATE $\text{AgClO}_3.$

100 grams cold water dissolve 10 grams AgClO_3 (Vauquelin); 20 gms. AgClO_3 (Wächter).

SILVER CHLORIDE AgCl.

SOLUBILITY IN WATER.

(A large number of determinations are quoted by Abegg and Cox — *Z. physik. Ch.* 46, 11, '03; see also Kohlrausch — *Ibid.* 50, 356, '04-'05; Böttger — *Ibid.* 46, 602, '03, 56, 93, '06.)

| t°. | 14°. | 20°. | 25°. | 42°. | 100°. |
|---------------------|--------|--------|--------|--------|--------|
| Gms. AgCl per liter | 0.0014 | 0.0016 | 0.0020 | 0.0040 | 0.0218 |

SOLUBILITY OF SILVER CHLORIDE IN AQUEOUS SOLUTIONS OF:

Ammonia at 0°.

(Jarry — *Ann. chim. phys.* [7] 17, 342, '99.)

Mono Methyl Amine at 11.5°.

(Jarry.)

| Grams per 100 Grams Solution. | | | | Gms. per 100 Gms. Solution. | |
|-------------------------------|-------|----------------------|-------|-----------------------------------|-------|
| NH ₃ Gas. | AgCl. | NH ₃ Gas. | AgCl. | NH ₂ CH ₃ . | AgCl. |
| 1.45 | 0.49 | 28.16 | 6.59 | 1.78 | 0.16 |
| 1.94 | 1.36 | 29.80 | 7.09 | 4.44 | 0.62 |
| 5.60 | 3.44 | 30.19 | 7.25 | 5.51 | 0.83 |
| 6.24 | 4.00 | 32.43 | 5.87 | 7.66 | 1.32 |
| 11.77 | 4.68 | 34.56 | 4.77 | 13.70 | 3.29 |
| 16.36 | 5.18 | 37.48 | 3.90 | 18.69 | 5.43 |
| | | | | 36.69 | 9.93 |

SOLUBILITY OF SILVER CHLORIDE IN AQUEOUS SOLUTIONS OF AMMONIA.

(Longi — *Gazz. chim. ital.* 13, 87, '83; at 25°, Valenta — *Monatsh. Ch.* 15, 250, '94; at 80°, Pohl — *Sitzber. Akad. Wiss. Wien*, 41, 627, '00.)

| Solvent. | t°. | Gms. AgCl per 100 Gms. Solvent. |
|-----------------------------------|-----|---------------------------------|
| Aq. Ammonia of 0.998 Sp. Gr. = 5% | 12 | 0.233 |
| " 0.96 Sp. Gr. = 10% | 18 | 7.84 |
| " 0.986 Sp. Gr. | 80 | 1.49 |
| " = 3% | 25 | 1.40 |
| " = 15% | 25 | 7.58 |

SOLUBILITY OF SILVER CHLORIDE IN AQUEOUS SOLUTIONS OF AMMONIUM CHLORIDE.

(Schierholz — *Sitzber. K. Akad. Wiss. (Vienna)* 101, 2b, 8, '90; see also Vogel — *N. Rep. Pharm.* 23, 335, '74. Hahn — *Wyandotte Silver Smelting Wks.*, 1877.)

Solubility at 15°.

Solubility at Different Temperatures.

| Grams per 100 Gms. Solution. | | t°. | Gms. per 100 Gms. Solution. | |
|------------------------------|--------------|-----|---|-------|
| NH ₄ Cl. | AgCl. | | NH ₄ Cl. | AgCl. |
| 10.00 | 0.0050 | 15 | 26.31 | 0.276 |
| 14.29 | 0.0143 | 40 | " | 0.329 |
| 17.70 | 0.0354 | 60 | " | 0.421 |
| 19.23 | 0.0577 | 80 | " | 0.592 |
| 21.98 | 0.110 | 90 | " | 0.711 |
| 25.31 | 0.228 | 100 | " | 0.856 |
| 28.45 | 0.340 (24.5) | 110 | " | 1.053 |
| Sat. at ord. temp. | 0.157 | | Sp. Gr. of 26.31 % NH ₄ Cl solution at 15° = 1.08. | |

SOLUBILITY OF SILVER CHLORIDE IN AQUEOUS SOLUTIONS OF ALUMINUM AND AMMONIUM SALTS.

(Valenta; see also Cohn — Z. physik. Ch. 18, 61, '95.)

| Aq. Salt Solution. | t°. | Gms. AgCl per 100 Gms. Solvent of Concentration: | | |
|------------------------|-----|--|----------|-----------|
| | | 1 : 100. | 5 : 100. | 10 : 100. |
| Aluminum Sulphocyanide | 25 | ... | ... | 2.02 |
| Ammonium Carbonate | 25 | ... | ... | 0.05 |
| “ Sulphocyanide | 20 | ... | 0.08 | 0.54 |
| “ Thio Sulphate | 20 | 0.57 | 1.32 | 3.92 |
| “ “ Calc. by Cohn* | | 0.64 | 3.07 | 5.86 |

* See Note, p. 281.

SOLUBILITY OF SILVER CHLORIDE IN AQUEOUS HYDROCHLORIC ACID SOLUTIONS AT ORDINARY TEMPERATURE.

(Pierre — J. pharm. chim. [3] 12, 237, '47; Vogel.)

| Solvent. | Gms. AgCl per Liter. | Solvent. | Gms. AgCl per Liter. |
|--|----------------------|--|----------------------|
| Conc. HCl + Aq. | 5.0 | 100 vol. sat. HCl + 10 vol. H ₂ O | 0.56 |
| 1 vol. Conc. HCl + 1 vol. H ₂ O | 1.6 | + 20 “ “ | 0.18 |
| Sat. HCl. Sp. Gr. 1.165 | 2.98 | + 30 “ “ | 0.09 |
| “ “ (at b. pt.) | 5.60 | + 50 “ “ | 0.035 |

SOLUBILITY OF SILVER CHLORIDE IN AQUEOUS SALT SOLUTIONS.

(Vogel; Hahn; Valenta)

| Salt Solution. | Conc. of Salt. | t°. | Gms. AgCl per 100 Gms. Solution. |
|-------------------------|----------------|------------|----------------------------------|
| Barium Chloride | 27.32% | 24.5 | 0.057 (H.) |
| Barium Chloride | saturated | ord. temp. | 0.014 (Vg.) |
| Barium Sulphocyanide | 10 : 100 | 25 | 0.20 (Vl.) |
| Calcium Sulphocyanide | 10 : 100 | 25 | 0.15 (Vl.) |
| Calcium Chloride | 41.26% | 24.5 | 0.571 (H.) |
| Calcium Chloride | saturated | ord. temp. | 0.093 (Vg.) |
| Copper Chloride | “ | 24.5 | 0.053 (H.) |
| Ferrous Chloride | “ | “ | 0.169 (H.) |
| Ferric Chloride | “ | “ | 0.006 (H.) |
| Manganese Chloride | “ | “ | 0.013 (H.) |
| Magnesium Chloride | 50 : 100 | 25 | 0.50 (Vl.) |
| Magnesium Chloride | 36.35% | 24.5 | 0.531 (H.) |
| Magnesium Chloride | saturated | ord. temp. | 0.171 (Vg.) |
| Strontium Chloride | “ | “ | 0.088 (Vg.) |
| Zinc Chloride | “ | 24.5 | 0.0134 (H.) |
| Potassium Chloride | “ | ord. temp. | 0.0475 (Vg.) |
| Potassium Chloride | 24.95% | 19.6 | 0.0776 (H.) |
| Potassium Cyanide | 5 : 100 | 25 | 2.75 (Vl.) |
| Potassium Cyanide | 5 : 100 | 25 | 5.24 (Cohn*) |
| Potassium Sulphocyanide | 10 : 100 | 25 | 0.11 (Vl.) |
| Sodium Chloride | saturated | ord. temp. | 0.095 (Vg.) |
| Sodium Chloride | 25.95% | 19.6 | 0.105 (H.) |

* See Note, page 281.

SOLUBILITY OF SILVER CHLORIDE IN AQUEOUS SOLUTIONS OF POTASSIUM CHLORIDE AT 15°.

(Schierholz — Sitzber. K. Akad. Wiss. (Vienna) 101, 2b, 8, '90.)

| Grams per 100 Grams Solution. | | Grams per 100 Grams Solution. | |
|-------------------------------|-------|----------------------------------|-------|
| KCl. | AgCl. | KCl. | AgCl. |
| 10.0 | 0.000 | 22.47 | 0.045 |
| 14.29 | 0.004 | 24.0 | 0.072 |
| 16.66 | 0.008 | 25.0 | 0.084 |
| 20.00 | 0.020 | Sp. Gr. of 25% KCl sol., = 1.179 | |

MIXTURES OF SILVER CHLORIDE AND SILVER HYDROXIDE IN EQUILIBRIUM WITH Aq. POTASSIUM HYDROXIDE SOLUTIONS AT 25°.

(Noyes and Kohr — J. Am. Ch. Soc. 24, 1144, '02.)

| Normality of KOH. | Millimols per Liter. | | Grams per Liter. | | |
|-------------------|----------------------|-------|------------------|-------|--------|
| | KCl. | KOH. | KCl. | KOH. | AgCl. |
| 0.333 | 3.414 | 347.8 | 0.255 | 10.05 | 0.4896 |
| 0.065 | 0.598 | 65.0 | 0.0446 | 2.00 | 0.0828 |

SOLUBILITY OF SILVER CHLORIDE IN Aq. SOL. OF SODIUM CHLORIDE. (Schierholz; Vogel; Hahn.)

| Solubility at 15°. | | t°. | Solubility at Different Temperatures. | |
|--------------------------------------|--------|-----|---------------------------------------|-------------|
| Gms. per 100 Gms. Solution. | | | Gms. AgCl per 100 Gms. Solution in: | |
| NaCl. | AgCl. | | 14% NaCl | 26.3% NaCl. |
| 10.0 | 0.0025 | 15 | 0.007 | 0.128 |
| 14.29 | 0.0071 | 30 | 0.011 | 0.132 |
| 18.18 | 0.0182 | 40 | 0.014 | 0.158 |
| 21.98 | 0.0439 | 50 | 0.023 | 0.184 |
| 23.53 | 0.0706 | 70 | 0.042 | 0.263 |
| 25.64 | 0.103 | 80 | 0.054 | 0.315 |
| 26.31 | 0.127 | 90 | 0.069 | 0.368 |
| | | 100 | 0.090 | 0.460 |
| Sp. Gr. of 26.31% NaCl sol. = 1.207. | | 109 | 0.107 (104°) | 0.571 |

SOLUBILITY AT 20°, 50°, AND 90° (CALC. FROM ORIGINAL).

(Barlow — J. Am. Chem. Soc. 28, 1446, '06)

| Gms. NaCl per 100 cc. Solution. | Gms. AgCl dissolved per 100 cc. Solution at: | | | Gms. NaCl per 100 cc. Solution. | Gms. AgCl dissolved per 100 cc. Solution at: | | |
|---------------------------------|--|--------|--------|---------------------------------|--|--------|--------|
| | 20°. | 50°. | 90°. | | 20°. | 50°. | 90°. |
| 3.43 | 0.00018 | 0.0016 | 0.0067 | 11.5 | 0.0031 | 0.0124 | 0.0436 |
| 4.60 | 0.00025 | 0.0025 | 0.0100 | 15.3 | 0.0090 | 0.0191 | 0.0732 |
| 5.75 | 0.00047 | 0.0034 | 0.0135 | 23.0 | 0.0313 | 0.0889 | 0.1706 |
| 7.67 | 0.00125 | 0.0058 | 0.0236 | | | | |

Results are also given for the solubility of silver chloride in aqueous sodium chloride solutions containing hydrochloric acid.

SOLUBILITY OF SILVER CHLORIDE IN Aq. SODIUM NITRATE SOLUTIONS.

| t°. | Gms. per 100 Gms. H ₂ O. | | t°. | Gms. per 100 Gms. H ₂ O. | |
|-------|-------------------------------------|---------|-------|-------------------------------------|----------|
| | NaNO ₃ . | AgCl. | | NaNO ₃ . | AgCl. |
| 5 | 0.787 | 0.00086 | 15-20 | 0.393 | 0.00096 |
| 18 | 0.787 | 0.00146 | " | 0.787 | 0.00133 |
| 30 | 0.787 | 0.00233 | " | 2.787 | 0.00253 |
| 45-55 | 0.787 | 0.00399 | | | (Mulder) |

SOLUBILITY OF SILVER CHLORIDE IN AQUEOUS SOLUTIONS OF
SODIUM THIO SULPHATE, ETC.

(Valenta; Cohn; Richards and Faber — Am. Ch. J. 21, 168, '99.)

| Salt Solution. | t°. | Gms. AgCl per 100 Gms. Aq. Solutions of Concentration: | | | | |
|----------------------|-----|--|--------|---------|---------|---------|
| | | 1:100. | 5:100. | 10:100. | 15:100. | 20:100. |
| Sodium Sulphite | 25 | ... | ... | 0.44 | ... | 0.95 |
| Sodium Thio Sulphate | 20 | 0.40 | 2.00 | 4.10 | 5.50 | 6.10 |
| " " Calc. by Cohn* | | 0.38 | 1.83 | 3.50 | 5.02 | 6.41 |
| Sodium Thio Sulphate | 35 | ... | ... | ... | ... | 9.08 † |
| Thio Carbamide | 25 | ... | ... | 0.83 | ... | ... |
| Thio Cyanime | 25 | 0.40 | 1.90 | 3.90 | ... | ... |

* See Note, page 281.

† Gms. per 100 cc. solution (R. and F.).

SILVER CHROMATE Ag_2CrO_4 .

One liter of water dissolves 0.026 gm. Ag_2CrO_4 at 18°, and 0.020 gm. at 25°. (Abegg and Cox — Z. physik. Ch. 46, 11, '03; Kohlrausch — *Ibid.* 50, 356, '04-'05)

SOLUBILITY OF SILVER CHROMATE IN AQUEOUS SOLUTIONS OF
NITRATES AT 100°.

(Carpenter — J. Soc. Chem. Ind. 5, 286, '86.)

| Solvent. | Gms. Salt | Gms. Ag_2CrO_4 |
|-------------------|------------------------------------|--------------------------------|
| | per 100 cc. H_2O . | per 100 cc. Solution. |
| Water | 0 | 0.064 |
| Sodium Nitrate | 50 | 0.064 |
| Potassium Nitrate | 50 | 0.192 |
| Ammonium Nitrate | 50 | 0.320 |
| Magnesium Nitrate | 50 | 0.256 |

SILVER (Di) CHROMATE $\text{Ag}_2\text{Cr}_2\text{O}_7$.

One liter of aqueous solution contains 0.00019 gram mols. or 0.083 gram $\text{Ag}_2\text{Cr}_2\text{O}_7$ at 15°. (Mayer — Ber. 36, 1741, '03)

SILVER CITRATE $\text{C}_6\text{H}_5\text{O}_7\text{Ag}_3$.

100 gms. H_2O dissolve 0.0277 gm. $\text{C}_6\text{H}_5\text{O}_7\text{Ag}_3$ at 18°, and 0.0284 gm. at 25°. (Partheil and Hübner — Archiv. Pharm. 241, 413, '03.)

SILVER CYANIDE AgCN .

One liter of aqueous solution contains 0.000043 gm. AgCN at 17.5° and 0.00022 gm. at 20° (by Conductivity Method).

(Abegg and Cox — Böttger — Z. physik. Ch. 46, 602, '03.)

SOLUBILITY OF SILVER CYANIDE IN AQUEOUS AMMONIA SOLUTIONS.

(Longi — Gazz. chem. ital. 13, 87, '83.)

100 gms. aq. ammonia of 0.998 Sp. Gr. = 5% dissolve 0.232 gm. AgCN at 12°.

100 gms. aq. ammonia of 0.96 Sp. Gr. = 10% dissolve 0.542 gm. AgCN at 18°.

SILVER SODIUM CYANIDE $\text{AgCN}.\text{NaCN}$.

100 gms. H_2O dissolve 20 gms. at 20°, and more at a higher temperature. 100 gms. 85% alcohol dissolve 4.1 gms. at 20°.

(Baup — Ann. chim. phys. [3] 53, 468, '58.)

SILVER THALLOUS CYANIDE $\text{AgCN}.\text{TlCN}$.

100 gms. H_2O dissolve 4.7 gms. at 0°, and 7.4 gms. at 16°.

(Fronmiller — Ber. 11, 92, '78.)

SILVER FLUORIDE AgF.

100 gms. H₂O dissolve 181.8 gms. at 15.8°. Sp. Gr. of sol. = 2.61.
(Gore — Proc. Roy. Soc. 18, 158, '90.)

SILVER FULMINATE CAg₂(NO₂)CN.

One liter of aqueous solution contains 0.075 gm. C₂Ag₂N₄O₂ at 13°, and 0.180 gm. at 30°. (Holleman — Rec. trav. chim. 15, 159, '96.)

SILVER HEPTOATE (Önanthylate) AgC₇H₁₃O₂.

SOLUBILITY IN WATER.

(Laudau — Monatsh. Ch. 14, 709, '93; Altschul — *Ibid.* 17, 568, '96.)

| t°. | Gms. AgC ₇ H ₁₃ O ₂ per 100 Gms. H ₂ O. | | t°. | Gms. AgC ₇ H ₁₃ O ₂ per 100 Gms. H ₂ O. | |
|-----|---|-------------------|-----|---|-------------------|
| 0 | 0.0635 (Laudau) | 0.0436 (Altschul) | 50 | 0.1652 (Laudau) | 0.0858 (Altschul) |
| 10 | 0.0817 | 0.0494 | 60 | 0.1906 | 0.1036 |
| 20 | 0.1007 | 0.0555 | 70 | 0.2185 | 0.1351 |
| 30 | 0.1206 | 0.0617 | 80 | 0.2495 | 0.1688 |
| 40 | 0.1420 | 0.0714 | | | |

SILVER IODATE AgIO₃.

One liter of aqueous solution contains 0.04 gram or 0.00014 g. mols. at 18°–20°, and 0.05334 gm. or 0.000189 g. mols. at 25°. (Longi; Böttger; Kohlrausch; Noyes and Kohr — J. Am. Ch. Soc. 24, 1141, '02.)

SOLUBILITY OF SILVER IODATE IN AQUEOUS SOLUTIONS OF AMMONIA AND OF NITRIC ACID AT 25°.

(Longi — Gazz. chim. ital. 13, 87, '83.)

100 gms. aq. ammonia of 0.998 Sp. Gr. = 5% dissolve 2.36 gms. AgIO₃.
100 gms. aq. ammonia of 0.96 Sp. Gr. = 10% dissolve 45.41 gms. AgIO₃.
100 gms. aq. nitric acid of 1.21 Sp. Gr. = 35% dissolve 0.096 gm. AgIO₃.

SILVER IODIDE AgI.

One liter of aqueous solution contains 0.0000028 gm. AgI at 20°–25°. (Average of several determinations by Kohlrausch, Abegg and Cox, etc. Holleman gives higher figures.)

1 liter of aq. ammonia of 0.96 Sp. Gr. = 10% dissolve 0.035 gm. AgI at 12°. (Longi.)

SOLUBILITY OF SILVER IODIDE IN AQUEOUS SALT SOLUTIONS.

(Valenta — Monatsh. Chem. 15, 250, '94; Cohn — Z. physik. Ch. 18, 61, '95.)

| Aq. Salt Solution. | t°. | Gms. AgI per 100 Gms. Aq. Solution of Concentration: | | | | |
|------------------------|-----|--|--------|---------|---------|---------|
| | | 1:100. | 5:100. | 10:100. | 15:100. | 20:100. |
| Sodium Thio Sulphate | 20 | 0.03 | 0.15 | 0.30 | 0.40 | 0.60 |
| " " Calc. by Cohn* | | 0.623 | 2.996 | 5.726 | 8.218 | 10.493 |
| Potassium Cyanide | 25 | ... | 8.28 | ... | ... | ... |
| " " Calc. by Cohn* | | ... | 8.568 | ... | ... | ... |
| Sodium Sulphite | 25 | ... | ... | 0.01 | ... | 0.02 |
| Ammonium Sulphocyanide | 20 | ... | 0.02 | 0.08 | 0.13 | ... |
| Calcium | 25 | ... | ... | 0.03 | ... | ... |
| Barium | 25 | ... | ... | 0.02 | ... | ... |
| Aluminum | 25 | ... | ... | 0.02 | ... | ... |
| Thio Carbamide | 25 | ... | ... | 0.79 | ... | ... |
| Thio Cyanime | 25 | 0.008 | 0.05 | 0.09 | ... | ... |

* See Note, page 281.

SOLUBILITY OF SILVER IODIDE IN AQUEOUS SOLUTIONS OF SODIUM CHLORIDE, POTASSIUM BROMIDE AND OF POTASSIUM IODIDE AT 15°.
(Schieberholz — Sitzb. K. Akad. Wiss. (Vienna) 101, 2b, 10, '90.)

| In Sodium Chloride. | | In Potassium Iodide. | |
|---------------------|----------------|----------------------|----------------|
| Gms. per 100 | Gms. Solution. | Gms. per 100 | Gms. Solution. |
| NaCl. | AgI. | KI. | AgI. |
| 26.31 | 0.0244 | 59.16 | 53.13 |
| 25.00 | 0.00072 | 57.15 | 40.0 |
| | | 50.0 | 25.0 |
| | | 40.0 | 13.0 |
| | | 33.3 | 7.33 |
| | | 25.0 | 2.75 |
| | | 21.74 | 1.576 |
| | | 20.0 | 0.80 |

In Potassium Bromide.

| Gms. per 100 | Gms. Solution. |
|--------------|----------------|
| KBr | AgI |
| 30.77 | 0.132 |

100 gms. sat. silver nitrate solution dissolve 2.3 gms. AgI at 11°, and 12.3 gms. at b. pt.

100 gms. pyridine dissolve 0.10 gm. AgI at 10°, and 8.60 gms. at 121°.

(von Laszcynski — Ber. 27, 2285, '94.)

SILVER MALATE $C_4H_4O_4Ag_2$.

100 gms. H_2O dissolve 0.0119 gm. at 18°, and 0.1216 gm. at 25°.

(Partheil and Hübner — Archiv. Pharm. 241, 413, '03.)

SILVER NITRATE $AgNO_3$.

SOLUBILITY IN WATER.

(Etard — Ann. chim. phys. [7] 2, 526, '94; Kremers — Pogg. Ann. 92, 497, '54; Tilden and Shenstone — Phil. Trans. 23, '84.)

| t°. | Grams $AgNO_3$ per 100 Gms. | | | t°. | Grams $AgNO_3$ per 100 Gms. | | |
|-----|-----------------------------|----|--------|-----|-----------------------------|-----|--------|
| | Solution. | | Water. | | Solution. | | Water. |
| -5 | 48 (Etard) | .. | ... | 50 | 79 (Etard) | 82 | 455 |
| 0 | 53 | 55 | 122 | 60 | 81.5 | 84 | 525 |
| 10 | 62 | 63 | 170 | 80 | 85.5 | 87 | 669 |
| 20 | 68 | 69 | 222 | 100 | 88.5 | 90½ | 952 |
| 25 | 70.5 | 72 | 257 | 120 | 91 | 95 | 1900 |
| 30 | 72.5 | 75 | 300 | 140 | 93.5 | ... | ... |
| 40 | 76.5 | 79 | 376 | 160 | 95 | ... | ... |

100 gms. $2HNO_3 \cdot 3H_2O$ dissolve 3.33 gms. $AgNO_3$ at 20°, and 16.6 gms. at 100°.

100 gms. conc. HNO_3 dissolve 0.2 gm. $AgNO_3$.

(Schultz — Zeit. Chem. [2] 5, 531, '69.)

MUTUAL SOLUBILITY OF SILVER NITRATE AND SODIUM NITRATE IN WATER.

(Hissnik — Z. physik. Ch. 32, 557, '00.)

Results at 25°.

| Gms. per 100 Gms. Sol. | | Wt. per cent in Mix Crystals. | |
|------------------------|----------|-------------------------------|----------|
| $AgNO_3$ | $NaNO_3$ | $AgNO_3$ | $NaNO_3$ |
| 47.32 | 0.0 | 100 | 0.0 |
| 44.01 | 8.78 | 99.1 | 0.9 |
| 36.78 | 20.42 | 42.9 | 57.1 |
| 29.97 | 23.2 | 33.6 | 66.4 |
| 24.56 | 24.82 | 27.6 | 72.4 |
| 8.02 | 26.41 | 9.9 | 90.1 |
| 0.0 | 26.77 | 0.0 | 100.0 |

Results at 50°.

| Gms. per 100 Gms. Sol. | | Wt. per cent in Mix Crystals. | |
|------------------------|----------|-------------------------------|----------|
| $AgNO_3$ | $NaNO_3$ | $AgNO_3$ | $NaNO_3$ |
| 29.78 | 0.0 | 100 | 0.0 |
| 27.9 | 2.5 | 99.5 | 0.5 |
| 26.4 | 4.2 | 99.3 | 0.7 |
| 23.0 | 6.3 | 42.9 | 57.1 |
| 18.3 | 7.1 | 31.0 | 69.0 |
| 9.5 | 8.3 | 17.5 | 82.5 |
| 0.0 | 8.54 | 0.0 | 100.0 |

SOLUBILITY OF SILVER NITRATE IN ALCOHOLS.

(de Bruyn — Z. physik. Ch. 10, 783, '92.)

100 gms. abs. methyl alcohol dissolve 3.72 gms. AgNO_3 at 19° .100 gms. abs. ethyl alcohol dissolve 3.10 gms. AgNO_3 at 19° .

SOLUBILITY OF SILVER NITRATE IN AQUEOUS ETHYL ALCOHOL.

(Eder — J. pr. Ch. [2] 17, 45, '78.)

| Sp. Gr. of Aq. Alcoholic Mixture. | Volume per cent Alcohol. | Gms. AgNO_3 per 100 Gms. Aq. Alcohol at: | | |
|---|--------------------------------|---|--------------|--------------|
| | | 15° . | 50° . | 75° . |
| 0.815 | 95 | 3.8 | 7.3 | 18.3 |
| 0.863 | 80 | 10.3 | ... | 42.0 |
| 0.889 | 70 | 22.1 | ... | ... |
| 0.912 | 60 | 30.5 | 58.1 | 89.0 |
| 0.933 | 50 | 35.8 | ... | ... |
| 0.951 | 40 | 56.4 | 98.3 | 160.0 |
| 0.964 | 30 | 73.7 | ... | ... |
| 0.975 | 20 | 107.0 | 214.0 | 340.0 |
| 0.986 | 10 | 158.0 | ... | ... |

100 gms. of a mixture of 1 vol. (95%) alcohol + 1 vol. ether dissolve 1.6 gms. AgNO_3 at 15° .100 gms. of a mixture of 2 vols. (95%) alcohol + 1 vol. ether dissolve 2.3 gms. AgNO_3 at 15° .100 gms. H_2O sat. with ether dissolve 88.4 gms. AgNO_3 at 15° .

(Eder.)

100 gms. acetone dissolve 0.35 gm. AgNO_3 at 14° , and 0.44 gm. at 18° .

(von Laszcynski — Ber. 27, 2285, '04; Naumann — Ber. 37, 4332, '04.)

SILVER NITRITE AgNO_2 .SOLUBILITY IN AQUEOUS SOLUTIONS OF SILVER NITRATE AT 18° .

(Naumann and Rucker — Ber. 38, 2293, '05.)

| Mols. per Liter. | | Grams per Liter. | | Mols. per Liter | | Grams per Liter. | |
|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| AgNO_3 . | AgNO_2 . | AgNO_3 . | AgNO_2 . | AgNO_3 . | AgNO_2 . | AgNO_3 . | AgNO_2 . |
| 0.0000 | 0.02067 | 0.000 | 3.184 | 0.02067 | 0.01435 | 3.512 | 2.201 |
| 0.00258 | 0.01975 | 0.439 | 3.042 | 0.04134 | 0.01168 | 7.024 | 1.799 |
| 0.00517 | 0.01900 | 0.878 | 2.926 | 0.08268 | 0.00961 | 14.048 | 1.480 |
| 0.01033 | 0.01689 | 1.756 | 2.601 | | | | |

SILVER OXALATE $\text{C}_2\text{O}_4\text{Ag}_2$.One liter of H_2O dissolves 0.035 gm. at 18° , and 0.0365 gm. at 20° .

(Böttger; Kohlrausch.)

SILVER OXIDE Ag_2O .One liter of H_2O dissolves 0.021 gm. at 20° , and 0.025 gm. at 25° .

(Noyes and Kohr; Böttger; Abegg and Cox)

SILVER PERMANGANATE AgMnO_4 .

100 gms. cold water dissolve 0.92 gm.; hot water dissolves more.

(Mitscherlich — Pogg. Ann. 25, 301, '32.)

SILVER PHOSPHATE Ag_3PO_4 .One liter of water dissolves 0.00644 gm. at 20° .

(Böttger — Z. physik. Ch. 46, 602, '03.)

SILVER PROPIONATE

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SILVER PROPIONATE C_3H_5COOAg .**SOLUBILITY IN WATER.**(Raupenstrauch — Monatsh. Ch. 6, 587, '85; Arrhenius — Z. physik. Ch. 11, 396, '93; Goldschmidt — *Ibid.* 25, 93, '98.)

| t° | Gms. $C_3H_5O_2Ag$ per Liter. | t° | Gms. $C_3H_5O_2Ag$ per Liter. | t° | Gms. $C_3H_5O_2Ag$ per Liter. |
|------|----------------------------------|----|----------------------------------|----|----------------------------------|
| 0 | 5.12 | 20 | 8.36 (8.48) | 50 | 13.35 |
| 10 | 6.78 | 25 | 9.06 | 70 | 17.64 |
| 18.2 | 8.36 (A.) | 30 | 9.93 (9.70) | 80 | 20.30 |

SOLUBILITY OF SILVER PROPIONATE IN AQUEOUS SOLUTIONS OF:
(Arrhenius.)

| Silver Nitrate at 19.7°. | | | | Sodium Propionate at 18.2°. | | | |
|--------------------------|---------------|------------------|---------------|-----------------------------|---------------|------------------|---------------|
| Mols. per Liter. | | Grams per Liter. | | Mols. per Liter. | | Grams per Liter. | |
| $AgNO_3$ | $C_3H_5O_2Ag$ | $AgNO_3$ | $C_3H_5O_2Ag$ | $C_3H_5O_2Na$ | $C_3H_5O_2Ag$ | $C_3H_5O_2Na$ | $C_3H_5O_2Ag$ |
| 0.0 | 0.0471 | 0.0 | 8.519 | 0.0 | 0.0462 | 0.0 | 8.362 |
| 0.0133 | 0.0415 | 2.289 | 7.511 | 0.0167 | 0.0393 | 1.607 | 7.114 |
| 0.0267 | 0.0379 | 4.577 | 6.86 | 0.0333 | 0.0345 | 3.215 | 6.244 |
| 0.0533 | 0.0307 | 9.059 | 5.556 | 0.0667 | 0.0258 | 6.429 | 4.670 |
| 0.100 | 0.0222 | 16.997 | 4.019 | 0.1333 | 0.0191 | 12.859 | 3.456 |
| | | | | 0.2667 | 0.0131 | 25.718 | 2.371 |
| | | | | 0.5000 | 0.0101 | 48.77 | 1.828 |

SILVER SALICYLATE $C_6H_4.OH.COONa$ 1,2.

One liter of aqueous solution contains 0.95 gm. at 23°.

(Holleman — Z. physik. Ch. 12, 129, '93.)

SILVER SUCCINATE $C_4H_4O_4Ag_2$.100 gms. H_2O dissolve 0.0176 gm. at 18°, and 0.0199 gm. at 25°.

(Partheil and Hübner — Archiv. Pharm. 241, 413, '03.)

SILVER SULPHATE Ag_2SO_4 .**SOLUBILITY IN WATER.**

(Euler — Z. physik. Ch. 40, 314, '04; Wright and Thomson — Phil. Mag. [5] 17, 288, '84; Wentzel — Dammer's "Handbuch" II, 2, 858; Drucker — Z. anorg. Ch. 28, 362, '01.)

| t° | Gms. Ag_2SO_4 per Liter. | Gm. Mols. Ag_2SO_4 per Liter. | |
|-----|----------------------------|---------------------------------|-------------|
| 17 | 7.70 | 0.0247 | (Euler.) |
| 18 | 7.28 | 0.0233 | (W. and T.) |
| 25 | 8.01 | 0.0257 | (D.) |
| 100 | 14.60 | ... | (W.) |

One liter of aqueous solution in contact with a mixture of silver sulphate and silver acetate contains 3.95 gms. Ag_2SO_4 + 8.30 gms. CH_3COOAg at 17°. Sp. Gr. of solution = 1.0094. (Euler.)

SOLUBILITY OF SILVER SULPHATE AT 25° IN AQUEOUS SOLUTIONS OF:
(Drucker.)

| Sulphuric Acid. | | | | Potassium Sulphate. | | | |
|------------------|-----------|------------------|-----------|---------------------|-----------|------------------|-----------|
| Mols. per Liter. | | Grams per Liter. | | Mols. per Liter. | | Grams per Liter. | |
| Ag_2SO_4 | H_2SO_4 | Ag_2SO_4 | H_2SO_4 | Ag_2SO_4 | K_2SO_4 | Ag_2SO_4 | K_2SO_4 |
| 0.0260 | 0.02 | 8.11 | 0.98 | 0.0246 | 0.02 | 7.67 | 1.74 |
| 0.0264 | 0.04 | 8.23 | 1.96 | 0.0236 | 0.04 | 7.36 | 3.49 |
| 0.0271 | 0.10 | 8.45 | 4.90 | 0.0231 | 0.10 | 7.20 | 8.72 |
| 0.0275 | 0.20 | 8.58 | 9.81 | 0.0232 | 0.20 | 7.24 | 17.44 |

SOLUBILITY OF SILVER SULPHATE AT 18° IN AQUEOUS SOLUTIONS OF:

(Eder — J. pr. Ch. [2] 17, 44, '78.)

| Ammonium Sulphate. | | Potassium Sulphate. | | Sodium Sulphate. | |
|--------------------------------|----------------------------|-----------------------------|----------------------------|-----------------------------|----------------------------|
| Gms. per 100 Gms. Solution. | | Gms. per 100 Gms. Solution. | | Gms. per 100 Gms. Solution. | |
| $(\text{NH}_4)_2\text{SO}_4$. | Ag_2SO_4 . | K_2SO_4 . | Ag_2SO_4 . | Na_2SO_4 . | Ag_2SO_4 . |
| 5 | 0.66 | 6 | 0.60 | 12 | 0.65 |
| 15 | 0.85 | 18 | 0.76 | 32 | 0.80 |

SILVER SULPHOCYANIDE AgSCN .

One liter of aqueous solution contains 0.0002 gm. at 25°, and 0.0064 gm. at 100°.

(Abegg and Cox — Z. physik. Ch. 46, 11, '03; Böttger — *Ibid.* 46, 60, '05; 56, 93, '06.)

SOLUBILITY OF MIXTURES OF SILVER THIOCYANATE AND POTASSIUM THIOCYANATE IN WATER AT 25°.

(Foote — Am. Ch. J. 30, 332, '03.)

| Gms. per 100 Gms. Solution. | | Mols. per 100 Mols. H_2O . | | Solid Phase. |
|-----------------------------|--------|--|--------|--|
| KSCN. | AgSCN. | KSCN. | AgSCN. | |
| 70.53 | ... | 44.36 | ... | KSCN |
| 66.55 | 9.32 | 51.13 | 4.19 | KSCN + 2KSCN.AgSCN |
| 64.47 | 10.62 | 47.98 | 4.60 | |
| 61.25 | 11.76 | 42.07 | 4.72 | Double Salt. 2KSCN.AgSCN = 53.92% KSCN |
| 58.34 | 13.55 | 38.47 | 5.23 | |
| 53.21 | 17.53 | 33.71 | 6.50 | 2KSCN.AgSCN + KSCN.AgSCN |
| 50.68 | 20.43 | 32.52 | 7.67 | |
| 49.43 | 20.32 | 30.29 | 7.28 | Double Salt. KSCN.AgSCN = 36.9% KSCN |
| 32.51 | 18.34 | 12.26 | 4.05 | |
| 24.68 | 16.41 | 7.77 | 3.02 | KSCN.AgSCN + AgSCN |
| 23.86 | 16.07 | 7.36 | 2.90 | |

SILVER TARTRATE $\text{C}_4\text{H}_4\text{O}_6\text{Ag}_2$.

100 gms. H_2O dissolve 0.2012 gm. $\text{C}_4\text{H}_4\text{O}_6\text{Ag}_2$ at 18°, and 0.2031 gm. at 25°.

(Partheil and Hübner — Archiv. Pharm. 241, 413, '03.)

SILVER VALERATES $\text{AgC}_5\text{H}_9\text{O}_2$.

SOLUBILITY IN WATER.

| Normal Valerate $\text{CH}_3(\text{CH}_2)_3\text{COOAg}$. | | | Iso Valerate $\text{CH}_3\text{CH}(\text{CH}_3)_2\text{CH}_2\text{COOAg}$. | | |
|---|---|--------|--|---|--------|
| (Fürth — Monatsh. Ch. 9, 311, '88; Sedlitzky — <i>Ibid.</i> 8, 563, '87.) | | | | | |
| °. | Gms. per 100 Gms. H_2O . Normal V. | Iso V. | °. | Gms. per 100 Gms. H_2O . Normal V. | Iso V. |
| 0 | 0.229 | 0.177 | 50 | 0.474 | 0.360 |
| 10 | 0.259 | 0.211 | 60 | 0.552 | 0.401 |
| 20 | 0.300 | 0.246 | 70 | 0.636 | 0.443 |
| 30 | 0.349 | 0.283 | 80 | ... | 0.486 |
| 40 | 0.408 | 0.321 | | | |

100 gms. H_2O dissolve 0.73 gm. silver valerate at 20°.

(Markwald — Ber. 32, 1089, '99.)

SOLUBILITY OF SILVER VALERATE IN AQUEOUS SOLUTIONS OF
SILVER ACETATE, SILVER NITRATE AND OF SODIUM
VALERATE.

(Arrhenius — Z. physik. Ch. 11 306, '93.)

In Silver Acetate at 17.8°.

| Mols. per Liter. | | Gms. per Liter. | |
|------------------|----------------|-----------------|----------------|
| $C_2H_3O_2Ag.$ | $C_2H_5O_2Ag.$ | $C_2H_3O_2Ag.$ | $C_2H_5O_2Ag.$ |
| 0.0 | 0.0094 | 0.0 | 1.96 |
| 0.0067 | 0.0070 | 1.13 | 1.46 |
| 0.0135 | 0.0057 | 2.27 | 1.19 |
| 0.0270 | 0.0037 | 4.54 | 0.77 |
| 0.0505 | 0.00265 | 8.48 | 0.55 |

In Silver Nitrate at 16.5°.

| Mols. per Liter. | | Gms. per Liter. | |
|------------------|----------------|-----------------|----------------|
| $AgNO_3.$ | $C_2H_5O_2Ag.$ | $AgNO_3.$ | $C_2H_5O_2Ag.$ |
| 0.0 | 0.0094 | 0.0 | 1.96 |
| 0.0067 | 0.0068 | 1.14 | 1.42 |
| 0.0133 | 0.0051 | 2.29 | 1.07 |
| 0.0267 | 0.0031 | 4.58 | 0.65 |
| 0.1000 | 0.0012 | 17.00 | 0.25 |

In Sodium Valerate at 18.6°.

| Mols. per Liter. | | Grams. per Liter. | |
|------------------|----------------|-------------------|----------------|
| $C_2H_3O_2Na.$ | $C_2H_5O_2Ag.$ | $C_2H_3O_2Na.$ | $C_2H_5O_2Ag.$ |
| 0.0 | 0.0095 | 0.0 | 1.986 |
| 0.0175 | 0.0047 | 2.17 | 0.982 |
| 0.0349 | 0.0030 | 4.32 | 0.627 |
| 0.0698 | 0.0018 | 8.65 | 0.376 |
| 0.1395 | 0.0015 | 17.31 | 0.313 |

SILVER VANADATE $Ag_2V_2O_7$.

One liter of aqueous solution contains 0.047 gram at 14°, and 0.073 gm. at 100°.

(Carnelly — Liebig's Ann. 166, 155, '73.)

SODIUM ACETATE $CH_3COONa \cdot 3H_2O$.

SOLUBILITY IN WATER.

Interpolated from original.

(Schiavor — Gazz. chim. ital. 32, II, 532, '02.)

| t°. | Gms. CH_3COONa per 100 Gms. | | t°. | Gms. CH_3COONa per 100 Gms. | |
|-----|----------------------------------|-----------|-----|----------------------------------|-----------|
| | Water. | Solution. | | Water. | Solution. |
| 0 | 34 | 25.4 | 25 | 53 | 34.7 |
| 10 | 41 | 29.1 | 30 | 57 | 36.3 |
| 20 | 49 | 32.9 | 40 | 65 | 39.4 |

100 gms. H_2O dissolve 46.9 gms. CH_3COONa at 31.5°.

(Köhler — Z. Ver. Zuckerind. 47, 447, '97.)

100 cc. aqueous solution contain 41.11 gms. CH_3COONa at 10°.

(Enklaar.)

SOLUBILITY OF SODIUM ACETATE IN AQUEOUS SOLUTIONS OF
ACETIC ACID.

(Enklaar — Rec. trav. chim. 20, 183, '01.)

| Gram Mols. per Liter. | | Grams per Liter. | |
|-----------------------|--------------|------------------|--------------|
| $CH_3COOH.$ | $CH_3COONa.$ | $CH_3COOH.$ | $CH_3COONa.$ |
| 0 | 5.0 | 0.0 | 411.1 |
| 0.085 | 5.0 | 5.1 | 410.3 |
| 0.12 | 5.0 | 7.2 | 410.4 |

SOLUBILITY OF SODIUM ACETATE IN ABSOLUTE ALCOHOL AT
ROOM TEMPERATURE.

(Böttker — Z. physik. Ch. 22, 510, '97.)

100 gms. alcohol dissolve 1.81 gms. CH_3COONa or 7.49 gms. $CH_3COONa \cdot 3H_2O$.

SOLUBILITY OF SODIUM ACETATE IN AQUEOUS ALCOHOL:

At 18°.

(Gerardin — Ann. chim. phys. [4] 5, 158, '65.)

At Different Temperatures.

(Schiavor.)

| Wt. per cent Alcohol. | Gms. CH ₃ COONa per 100 Gms. Aq. Alcohol. | t°. | Degree of Alcohol. | Gms. per 100 Gms. Alcohol. | |
|-----------------------|--|-----|--------------------|----------------------------|--|
| | | | | CH ₃ COONa. | CH ₃ COONa.3H ₂ O. |
| 5.2 | 38.0 | 8 | 98.4 | 2.08 | 3.45 |
| 9.8 | 35.9 | 12 | 98.4 | 2.12 | 3.51 |
| 23.0 | 29.8 | 19 | 98.4 | 2.33 | 3.86 |
| 29.0 | 27.5 | 11 | 90 | 2.07 | 3.42 |
| 38.0 | 23.5 | 13 | 90 | 2.13 | 3.52 |
| 45.0 | 20.4 | 15 | 63 | 13.46 | 22.32 |
| 59.0 | 14.6 | 18 | 63 | 13.88 | 23.03 |
| 86.0 | 3.9 | 21 | 63 | 14.65 | 24.30 |
| 91.0 | 2.1 | 23 | 40 | 28.50 | 47.27 |

100 gms. H₂O dissolve 237.6 gms. sugar + 57.3 grams CH₃COONa, or 100 gms. of the saturated solution contain 58.93 gms. sugar + 14.44 gms. CH₃COONa at 31.25°.

(Köhler.)

SODIUM ARSENATE Na₂AsO₄.12H₂O.

100 grams aqueous solution contain 21.1 grams Na₂AsO₄.12H₂O. (= 10.4 gms. Na₂AsO₄) at 17°. Sp. Gr. of solution = 1.1186.

(Schiff — Liebig's Ann. 113, 350, '60.)

100 grams glycerine dissolve 50 gms. sodium arsenate at 15.5°.

(Pharm. Centralh. No. 30, '81.)

SODIUM HYDROGEN ARSENATE Na₂HAsO₄.12H₂O.

100 gms. H₂O dissolve 17.2 gms. Na₂HAsO₄.12H₂O (= 7.3 gms. anhydrous) at 0°. 56.0 gms. (= 19.89 gms. anhydrous) at 14°. Sp. Gr. 1.1722, 37.0 gms. anhydrous at 21°, and 140.7 gms. hydrated at 30°.

(Schiff — Liebig's Ann. 113, 350, '60; Tilden — J. Ch. Soc. 45, 409, '84.)

SODIUM BENZOATE C₆H₅.COONa.

100 gms. H₂O dissolve 62 gms. at 25°, and 77 gms. at b. pt.

100 gms. alcohol dissolve 2.3 gms. at 25°, and 8.3 gms. at b. pt.

(U. S. P.)

SODIUM (Tetra) BORATE Na₂B₄O₇.10H₂O (Borax).

SOLUBILITY IN WATER.

(Horn and Van Wagener — Am. Ch. J. 30, 347, '03.)

| t°. | Gms. Na ₂ B ₄ O ₇ per 100 Gms. H ₂ O. | t°. | Gms. Na ₂ B ₄ O ₇ per 100 Gms. H ₂ O. | t°. | Gms. Na ₂ B ₄ O ₇ per 100 Gms. H ₂ O. |
|------|---|-----|---|-----|---|
| 5 | 1.3 | 50 | 10.5 | 60 | 19.4 |
| 10 | 1.6 | 54 | 13.3 | 62 | 22.0 |
| 21.5 | 2.8 | 55 | 14.2 | 65 | 22.0 |
| 30 | 3.9 | 56 | 15.0 | 70 | 24.4 |
| 37.5 | 5.6 | 57 | 16.0 | 80 | 31.5 |
| 45 | 8.1 | | | 90 | 41.0 |
| | | | | 100 | 52.5 |

Transition temperature Na₂B₄O₇.10H₂O → Na₂B₄O₇.5H₂O approximately 62°. Sp. Gr. of saturated solution at 15° = 1.032. (Gerlach.)

SODIUM BORATES

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SOLUBILITY OF SODIUM BORATES IN WATER AT 30°.

(Dukelski — Z. anorg. Ch. 50, 42, '06, complete references given.)

| Gms. per 100 Gms. Solution. | | Gms. per 100 Gms. Residue. | | Solid Phase. |
|-----------------------------|---------------------------------|----------------------------|---------------------------------|---|
| K ₂ O. | B ₂ O ₃ . | K ₂ O. | B ₂ O ₃ . | |
| 42.0 | ... | ... | ... | NaOH.H ₂ O |
| 41.37 | 5.10 | 43.54 | 4.19 | " |
| 38.85 | 5.55 | 37.20 | 11.18 | Na ₂ O.B ₂ O ₃ .4H ₂ O |
| 34.44 | 3.73 | 33.52 | 10.80 | " |
| 29.39 | 2.51 | 29.63 | 10.11 | " |
| 26.13 | 2.75 | 27.85 | 15.21 | " |
| 23.00 | 3.82 | 24.91 | 11.60 | " |
| 16.61 | 13.69 | 21.29 | 20.64 | " |
| 21.58 | 4.63 | 24.52 | 19.04 | Na ₂ O.B ₂ O ₃ .4H ₂ O + Na ₂ O.B ₂ O ₃ .8H ₂ O |
| 20.58 | 4.69 | 21.61 | 16.59 | Na ₂ O.B ₂ O ₃ .8H ₂ O |
| 15.32 | 6.21 | 19.70 | 17.84 | " |
| 12.39 | 9.12 | 18.05 | 18.17 | " |
| 8.85 | 10.49 | 11.72 | 20.62 | Na ₂ O.2B ₂ O ₃ .10H ₂ O |
| 5.81 | 6.94 | 10.82 | 21.31 | " |
| 1.88 | 2.41 | 7.31 | 15.50 | " |
| 1.38 | 5.16 | 7.16 | 17.44 | " |
| 2.02 | 7.79 | 6.24 | 16.38 | " |
| 4.08 | 17.20 | 8.96 | 29.20 | Na ₂ O.2B ₂ O ₃ .10H ₂ O + Na ₂ O.5B ₂ O ₃ .10H ₂ O |
| 3.79 | 15.84 | 5.68 | 28.19 | Na ₂ O.5B ₂ O ₃ .10H ₂ O |
| 2.26 | 12.14 | 5.21 | 29.19 | " |
| 1.99 | 11.84 | 5.74 | 39.66 | Na ₂ O.2B ₂ O ₃ .10H ₂ O + B(OH) ₃ |
| 1.86 | 11.18 | 1.06 | 28.78 | B(OH) ₃ |
| 0.64 | 6.11 | 0.31 | 31.19 | " |
| ... | 3.54 | ... | ... | " |

100 gms. alcohol of 0.941 Sp. Gr. dissolve 2.48 gms. sodium borate at 15.5°.

100 gms. glycerine dissolve 60.3 gms. at 15.5°, and 100 gms. at 80°.
(U.S.P.)

Gaudolphe — J. pharm. chim. [4] 22, 366, '75 — says that glycerine dissolves its weight of sodium borate at ordinary temperatures.

SODIUM BROMATE NaBrO₃.

SOLUBILITY IN WATER.

(Kremers — Pogg. Ann. 94, 271, 55: 97, 5, '56.)

| t °. | 0° | 20° | 40° | 60° | 80° | 100° |
|---|------|------|------|------|------|------|
| Gms. NaBrO ₃ per 100 Gms. H ₂ O | 27.5 | 34.5 | 50.2 | 62.5 | 75.7 | 90.9 |

Sp. Gr. of saturated solution at 19.5° = 1.231.

(Gerlach.)

SODIUM BROMIDE $\text{NaBr} \cdot 2\text{H}_2\text{O}$.

SOLUBILITY IN WATER.

(Etard — *Compt. rend.* 98, 1432, '84; de Coppet — *Ann. chim. phys.* [5] 30, 411, '83.)

| t°. | Grams NaBr per 100 Gms. H_2O . | | t°. | Grams NaBr per 100 Gms. H_2O . | |
|-----|---|-------|-----|---|------|
| -20 | 57.5* | 71.4† | 50 | 95-112* | 116† |
| 0 | 66 | 79.5 | 60 | 112 | 117 |
| 10 | 72 | 84.5 | 80 | 113 | 119 |
| 20 | 77 | 90.3 | 100 | 114 | 121 |
| 30 | 82.5 | 97.3 | 120 | 116 | 124 |
| 40 | 88.0 | 105.8 | 140 | 118 | ... |

* Etard.

† de Coppet.

Transition temperature for $\text{NaBr} \cdot 2\text{H}_2\text{O} \rightarrow \text{NaBr}$ is approximately 50°. Kremers — *Pogg. Ann.* 97, 14, '56 — gives results which fall near those of de Coppet for the $\text{NaBr} \cdot 2\text{H}_2\text{O}$, and near those of Etard for the NaBr section of the curve.

SOLUBILITY OF SODIUM BROMIDE IN AQUEOUS SOLUTIONS OF SODIUM HYDROXIDE AT 17°.

(Ditte — *Compt. rend.* 124, 30, '97.)

| Gms. per 100 Gms. H_2O . | | Gms. per 100 Gms. H_2O . | | Gms. per 100 Gms. H_2O . | |
|--|-------|--|-------|--|-------|
| NaOH. | NaBr. | NaOH. | NaBr. | NaOH. | NaBr. |
| 0.0 | 91.38 | 17.17 | 63.06 | 28.43 | 48.00 |
| 3.26 | 79.86 | 19.12 | 62.51 | 36.61 | 38.41 |
| 9.24 | 68.85 | 22.35 | 59.60 | 46.96 | 29.37 |
| 13.43 | 64.90 | 24.74 | 55.03 | 54.52 | 24.76 |

SOLUBILITY OF SODIUM BROMIDE IN ALCOHOLIC SOLUTIONS.

(Rohland — *Z. anorg. Ch.* 18, 327, '98; *Z. anal. Ch.* 44, 252, '05; de Bruyn — *Z. physik. Ch.* 10, 783 '92; Eder — *Dingl. polyt.* 221, 89, '75.)

| Alcohol. | Concentration of Aq. Alcohol. | t°. | Gms. NaBr per 100 Gms. Alcohol. | |
|----------------|----------------------------------|------------|---------------------------------------|---|
| Methyl Alcohol | $d_{15} = 0.799$ | room temp. | 21.7 | (R.) |
| Ethyl " | $d_{15} = 0.810$ | " | 7.14 | " |
| Propyl " | $d_{15} = 0.816$ | " | 2.01 | " |
| Ethyl " | 90% by vol. | ? | 4.0 | (hydrated NaBr) |
| Methyl " | Absolute | 19.5 | 17.35 | (de Bruyn.) |
| Ethyl " | " | 15 | 6.3 | ($\text{NaBr} \cdot 2\text{H}_2\text{O}$) (Eder.) |
| Ethyl Ether | " | 15 | 0.08 | " |

SODIUM CARBONATE Na_2CO_3 .

SOLUBILITY IN WATER.

(Mulder; Löwel — Ann. chim. phys. [3] 33, 382, '51; at 15°, Reich — Monatsh. Ch. 12, 464, '91; at 32-34.5° $\text{Na}_2\text{CO}_3 \cdot 7\text{H}_2\text{O}$ b, Ketner — Z. physik. Ch. 39, 646, '01-'02.)

Solid Phase:

| °. | $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$ Gms. Na_2CO_3 per 100 Gms. | | $\text{Na}_2\text{CO}_3 \cdot 7\text{H}_2\text{O}$ (b). | | $\text{Na}_2\text{CO}_3 \cdot 7\text{H}_2\text{O}$ (a). | |
|------|--|-----------|---|-----------|---|-----------|
| | Water. | Solution. | Water. | Solution. | Water. | Solution. |
| 0 | 7.0 | 6.5 | 20.4 | 16.9 | 32.0 | 24.2 |
| 5 | 9.5 | 6.9 | 23.2 | 18.8 | 35.0 | 25.9 |
| 10 | 12.5 | 11.1 | 26.2 | 20.8 | 37.8 | 27.4 |
| 15 | 16.4 | 14.1 | 29.5 | 22.8 | 41.2 | 29.2 |
| 20 | 21.5 | 17.7 | 33.5 | 25.1 | 45.5 | 31.3 |
| 25 | 28.2 (29.8*) | 22.0 | 38.0 | 27.5 | | |
| 30 | 37.8 (40.9*) | 27.4 | 43.5 | 30.3 | | |
| 32.5 | 46.2 | 31.6 | (32.1°) 46.6 | 31.8 | | |
| | | | (33.3°) 48.6 | 32.7 | | |
| 35 | 46.2 | 31.6 | (34.5°) 51.3 | 33.9 | | |
| 40 | 46.1 (49.7*) | 31.5 | Solid Phase $\text{Na}_2\text{CO}_3 \cdot \text{H}_2\text{O}$ | | | |
| 60 | 46.0 (46.4*) | 31.5 | | | | |
| 80 | 45.8 (45.2*) | 31.4 | | | | |
| 100 | 45.5 | 31.3 | | | | |
| 105 | 45.2 | 31.1 | | | | |

* Epple — Dissertation, Heidelberg, p. 26, 1899.

Sp. Gr. of solution saturated at 17.5°, 1.165 (Hager); at 18°, 1.172 (Kohlrausch); at 23°, 1.222 (Schiff); at 30°, 1.342 (Lunge). See also Wegschroeder and Waller — Monatsh. Chem. 26, 685, '05, for Sp. Gr. determinations at other temperatures.

SOLUBILITY OF SODIUM CARBONATE IN AQUEOUS SOLUTIONS
OF SODIUM CHLORIDE AT 15°.
(Reich.)

| Gms. per 100 Gms. H_2O . | | Gms. NaCl Gms. Na_2CO_3 per 100 per 100 Gms. | | Gms. per 100 Gms. H_2O . | | Gms. NaCl Gms. Na_2CO_3 per 100 per 100 Gms. | |
|---|--|--|----------------------------|---|--|--|----------------------------|
| NaCl . | Na_2CO_3 $\cdot 10\text{H}_2\text{O}$ | Gms. Solution. | NaCl Solution. | NaCl . | Na_2CO_3 $\cdot 10\text{H}_2\text{O}$ | Gms. Solution. | NaCl Solution. |
| 0.0 | 61.42 | 0.0 | 16.42 | 23.70 | 39.06 | 15.96 | 9.76 |
| 4.03 | 53.86 | 2.92 | 14.47 | 27.93 | 39.73 | 18.26 | 9.62 |
| 8.02 | 48.00 | 5.80 | 12.87 | 31.65 | 41.44 | 20.06 | 9.73 |
| 12.02 | 43.78 | 8.61 | 11.62 | 35.46 | 43.77 | 21.75 | 7.95 |
| 16.05 | 40.96 | 11.31 | 10.70 | 37.23 | 45.27* | 22.46 | 10.13 |
| 19.82 | 39.46 | 13.71 | 10.11 | | | | |

* Both salts in solid phase.

SOLUBILITY OF SODIUM CARBONATE IN AQUEOUS SOLUTIONS
OF ETHYL AND OF PROPYL ALCOHOL AT 20°.
(Linebarger — Am. Ch. J. 14, 380, '92.)

| Wt. per cent Alcohol. | Gms. Na_2CO_3 per 100 Gms. Sol. | | Wt. per cent Alcohol. | Gms. Na_2CO_3 per 100 Gms. Sol. | |
|--------------------------|--|------------|--------------------------|--|------------|
| | In Ethyl. | In Propyl. | | In Ethyl. | In Propyl. |
| 28 | ... | 4.4 | 48 | 0.9 | 1.3 |
| 38 | ... | 2.7 | 50 | 0.84 | 1.2 |
| 44 | 1.7 | 1.7 | 54 | 0.80 | 0.9 |
| 46 | 1.13 | 1.5 | 62 | ... | 0.4 |

SOLUBILITY OF SODIUM CARBONATE IN AQUEOUS SOLUTIONS OF
ETHYL ALCOHOL.

(Ketner — Z. physik. Ch. 39, 646, '01-'02.)

NOTE. — The mixtures were so made that an alcoholic and an aqueous layer were formed, and these were brought into equilibrium with the solid phase.

| t°. | Gms. per 100 Gms. Alcoholic Layer. | | | Gms. per 100 Gms. Aq. Layer. | | | Solid Phase. |
|------|---|-----------------------------------|-------------------|-----------------------------------|-----------------------------------|-------------------|--|
| | C ₂ H ₅ OH. | Na ₂ CO ₃ . | H ₂ O. | C ₂ H ₅ OH. | Na ₂ CO ₃ . | H ₂ O. | |
| 35 | 62.9 | 0.3 | 36.8 | 1.0 | 32.4 | 66.6 | Na ₂ CO ₃ .H ₂ O |
| 40 | 61.0 | 0.4 | 38.6 | 1.2 | 31.9 | 66.9 | " |
| 49 | 61.0 | 0.4 | 38.6 | 1.2 | 31.5 | 67.3 | " |
| 68 | 55.8 | 0.9 | 43.3 | 2.3 | 28.8 | 68.9 | " |
| 31.2 | 52.4 | 0.8 | 46.8 | ... | 29.3 | ... | Na ₂ CO ₃ .7H ₂ O (b) |
| 31.9 | 54.8 | 0.7 | 44.5 | 1.7 | 29.8 | 68.5 | " |
| 32.3 | 56.1 | 0.6 | 43.3 | 1.5 | 30.2 | 68.3 | " |
| 33.2 | 58.1 | 0.5 | 42.4 | 1.4 | 31.0 | 67.6 | " |
| 27.7 | Crit. sol. $\pm 14\%$ C ₂ H ₅ OH $\pm 13\%$ Na ₂ CO ₃ $\pm 73\%$ H ₂ O | | | | | | |
| 28.2 | 23.5 | 7.3 | 69.2 | 7.9 | 18.6 | 73.5 | Na ₂ CO ₃ .10H ₂ O |
| 29.0 | 32.7 | 3.8 | 63.5 | 4.3 | 22.7 | 73.0 | " |
| 29.7 | 40.0 | 2.1 | 57.9 | 2.9 | 25.5 | 71.6 | " |
| 30.6 | 47.8 | 1.2 | 51.0 | 2.3 | 27.8 | 69.9 | " |

SOLUBILITY OF Na₂CO₃.10H₂O IN DILUTE ALCOHOL AT 21°.

(Ketner.)

| Grams per 100 Grams Solution. | | | Grams per 100 Grams Solution. | | |
|-----------------------------------|-----------------------------------|-------------------|-----------------------------------|-----------------------------------|-------------------|
| Na ₂ CO ₃ . | C ₂ H ₅ OH. | H ₂ O. | Na ₂ CO ₃ . | C ₂ H ₅ OH. | H ₂ O. |
| 18.5 | 0.0 | 81.5 | 1.2 | 39.2 | 59.6 |
| 12.7 | 6.2 | 81.1 | 0.2 | 58.2 | 41.6 |
| 6.9 | 15.3 | 77.8 | 0.1 | 67.1 | 32.8 |
| 3.2 | 26.1 | 70.7 | 0.06 | 73.3 | 26.64 |

100 gms. saturated solution in glycol contain 3.28–3.4 gms. sodium carbonate.

(de Coninck — Bull. acad. roy. Belgique, 359, '05.)

100 gms. H₂O dissolve 229.2 gms. sugar + 24.4 gms. Na₂CO₃, or 100 gms. sat. aq. solution contain 64.73 gms. sugar + 6.89 gms. Na₂CO₃.

(Schler — Z. Ver. Zuckerind. 47, 447, '97.)

SODIUM (Bi) CARBONATE NaHCO₃.

SOLUBILITY IN WATER.

(Dibbitts — J. pr. Ch. [2] 10, 439, '74.)

| t°. | Gms. NaHCO ₃ per 100 Gms. | | t°. | Gms. NaHCO per 100 Gms. | |
|-----|--------------------------------------|-----------|-----|-------------------------|-----------|
| | Water. | Solution. | | Water. | Solution. |
| 0 | 6.9 | 6.5 | 30 | 11.1 | 10.0 |
| 10 | 8.15 | 7.5 | 40 | 12.7 | 11.3 |
| 20 | 9.6 | 8.8 | 50 | 14.45 | 12.6 |
| 25 | 10.35 | 9.4 | 60 | 16.4 | 13.8 |

Sp. Gr. of sat. solution at 16° = 1.069.

(Stolba.)

100 gms. alcohol of 0.941 Sp. Gr. dissolve 1.2 gms. NaHCO₃ at 15.5°.

100 gms. glycerine dissolve 8 gms. NaHCO₃ at 15.5°.

SODIUM (Bi) CARBONATE 298

SOLUBILITY OF SODIUM BICARBONATE IN AQUEOUS AMMONIUM BICARBONATE SOLUTIONS SATURATED WITH CO₂. (Fedotieff — Z. physik. Ch. 49, 169, '04.)

| t°. | Wt. of 1 cc. Solution. | Mols. per 1000 Gms. H ₂ O. | | Grams per 1000 Gms. H ₂ O. | |
|-----|---------------------------|---------------------------------------|----------------------|---------------------------------------|----------------------|
| | | NH ₄ HCO ₃ . | NaHCO ₃ . | NH ₄ HCO ₃ . | NaHCO ₃ . |
| 0 | 1.072 | 1.39 | 0.58 | 109.4 | 48.2 |
| " | ... | 0.0 | 0.82 | 0.0 | 69.0 |
| 15 | 1.056 | 0.0 | 1.05 | 0.0 | 88.0 |
| " | 1.061 | 0.29 | 0.95 | 23.0 | 80.0 |
| " | 1.065 | 0.56 | 0.89 | 44.0 | 74.6 |
| " | 1.073 | 1.08 | 0.79 | 85.7 | 66.7 |
| " | 1.090 | 2.16 | 0.71 | 170.6 | 59.2 |
| 30 | ... | 0.0 | 1.65 | 0.0 | 138.6 |
| " | ... | 2.91 | 0.83 | 23.0 | 70.0 |

SOLUBILITY OF SODIUM BICARBONATE IN AQUEOUS SOLUTIONS OF SODIUM CHLORIDE SATURATED WITH CO₂. (Fedotieff; see also Reich — Monatsh. Ch. 12, 464, '91.)

| t°. | Wt. of 1 cc. Solution. | Mols. per 1000 Gms. H ₂ O. | | Grams per 1000 Gms. H ₂ O. | |
|-----|---------------------------|---------------------------------------|----------------------|---------------------------------------|----------------------|
| | | NaCl. | NaHCO ₃ . | NaCl. | NaHCO ₃ . |
| 0 | ... | 0.0 | 0.82 | 0.0 | 69.0 |
| " | 1.208 | 6.0 | 0.09 | 350.1 | 7.7 |
| 15 | 1.056 | 0.0 | 1.05 | 0.0 | 88.0 |
| " | 1.063 | 0.52 | 0.82 | 30.2 | 68.6 |
| " | 1.073 | 1.03 | 0.64 | 60.1 | 53.6 |
| " | 1.096 | 2.11 | 0.41 | 123.1 | 34.8 |
| " | 1.127 | 3.20 | 0.28 | 187.2 | 23.0 |
| " | 1.158 | 4.39 | 0.19 | 256.9 | 16.1 |
| " | 1.203 | 6.06 | 0.12 | 354.6 | 10.0 |
| 30 | 1.066 | 0.0 | 1.31 | 0.0 | 110.2 |
| " | 1.079 | 1.02 | 0.87 | 59.9 | 72.8 |
| " | 1.100 | 2.08 | 0.56 | 121.9 | 47.3 |
| " | 1.127 | 3.18 | 0.38 | 186.3 | 32.0 |
| " | 1.156 | 4.38 | 0.27 | 256.0 | 22.3 |
| " | 1.199 | 6.12 | 0.17 | 358.1 | 13.9 |
| 45 | 1.077 | 0.0 | 1.65 | 0.0 | 138.6 |
| " | 1.086 | 1.04 | 1.12 | 60.7 | 94.0 |
| " | 1.115 | 2.65 | 0.62 | 155.2 | 52.0 |
| " | 1.127 | 3.24 | 0.52 | 189.4 | 43.4 |
| " | 1.155 | 4.38 | 0.37 | 256.1 | 30.7 |
| " | 1.198 | 6.18 | 0.23 | 361.5 | 19.5 |

100 grams alcohol of 0.941 Sp. Gr. dissolve 5.55 grams sodium sulpho carbonate at 15.5°.

SODIUM CHLORATE NaClO₃.

SOLUBILITY IN WATER. (Kremers — Pogg. Ann. 97, 4, '56.)

| t°. | Grams per 100 Grams | | t°. | Grams per 100 Grams | |
|-----|---------------------|-----------|-----|---------------------|-----------|
| | Water. | Solution. | | Water. | Solution. |
| 0 | 81.9 | 45.0 | 60 | 147.1 | 59.5 |
| 12 | 89.3 | 47.2 | 80 | 175.6 | 63.7 |
| 20 | 99.0 | 49.7 | 100 | 232.6 | 69.9 |
| 40 | 123.5 | 55.3 | 120 | 333.3 | 76.9 |

SOLUBILITY OF SODIUM CHLORATE IN AQUEOUS SODIUM CHLORIDE SOLUTIONS AT 20°.

(Winteler — Z. Electrochem. 7, 360, '00.)

| Volume Wt. of Solutions. | Grams per Liter. | | Volume Wt. of Solutions. | Grams per Liter. | |
|-----------------------------|------------------|----------------------|-----------------------------|------------------|----------------------|
| | NaCl. | NaClO ₃ . | | NaCl. | NaClO ₃ . |
| 1.426 | 5 | 668 | 1.365 | 175 | 393 |
| 1.419 | 25 | 638 | 1.345 | 200 | 338 |
| 1.412 | 50 | 599 | 1.319 | 225 | 271 |
| 1.405 | 75 | 559 | 1.289 | 250 | 197 |
| 1.398 | 100 | 522 | 1.256 | 275 | 120 |
| 1.389 | 125 | 484 | 1.235 | 290 | 78 |
| 1.379 | 150 | 442 | 1.217 | 300 | 55 |

100 gms. H₂O dissolve 24.4 gms. NaCl + 50.75 gms. NaClO₃ at 12°.100 gms. H₂O dissolve 11.5 gms. NaCl + 249.6 gms. NaClO₃ at 122°.

(Schlosing — Compt. rend. 73, 1273, '71.)

100 gms. alcohol of 77 Wt. per cent dissolve 2.9 gms. NaClO₃ at 16°.

(Wittstein.)

100 gms. alcohol dissolve 1 gm. NaClO₃ at 25°, and 2.5 gms. at b. pt.100 gms. glycerine dissolve 20 gms. NaClO₃ at 15.5°.

SODIUM CHLORIDE NaCl.

SOLUBILITY IN WATER.

(Mulder; de Coppet — Ann. chim. phys. [5] 30, 411, '83; Andrieu — J. pr. Ch. [2] 29, 456, '84; above 100°, Tilden and Shenstone — Phil. Trans. 23, '84; Berkeley — Trans. Roy. Soc. (Lond.) 203 A, 206, '04; Etard — Ann. chim. phys. [7] 2, 527, '04, gives irregular results.)

| t°. | Gms. NaCl per 100 Gms. H ₂ O. | | Gms. NaCl per 100 g. Sol. | t°. | Gms. NaCl per 100 Gms. H ₂ O. | | Gms. NaCl per 100 g. Sol. |
|-----|---|--------|---------------------------------|-----|---|--------|---------------------------------|
| | 35.7* | 35.63† | | | 37.8* | 37.51† | |
| 0 | 35.7* | 35.63† | 26.28† | 70 | 37.8* | 37.51† | 27.27† |
| 10 | 35.8 | 35.69 | 26.29 | 80 | 38.4 | 38.00 | 27.54 |
| 20 | 36.0 | 35.82 | 26.37 | 90 | 39.0 | 38.52‡ | 27.80 |
| 25 | 36.12 | 35.92 | 26.43 | 100 | 39.8 | 39.12‡ | 28.12 |
| 30 | 36.3 | 36.03 | 26.49 | 118 | . | 39.8 | 28.46 |
| 40 | 36.6 | 36.32 | 26.65 | 140 | | 42.1 | 29.63 |
| 50 | 37.0 | 36.67 | 26.83 | 160 | | 43.6 | 30.37 |
| 60 | 37.3 | 37.06 | 27.04 | 180 | | 44.9 | 30.98 |

* M.; de C.

† A.

‡ B.

SOLUBILITY OF SODIUM CHLORIDE IN AQUEOUS SOLUTIONS OF AMMONIUM CHLORIDE.

(Fedotieff — Z. physik. Ch. 49, 170, '04.)

| t°. | Wt. of 1 cc. Solution. | Mols. per 1000 Gms. H ₂ O. | | Grams per 1000 Gms. H ₂ O. | |
|-----|---------------------------|---------------------------------------|-------|---------------------------------------|-------|
| | | NH ₄ Cl. | NaCl. | | |
| 0 | ... | 0.0 | 6.09 | 0.0 | 356.3 |
| " | 1.185 | 2.73 | 4.89 | 146.1 | 286.4 |
| 15 | 1.200 | 0.0 | 6.12 | 0.0 | 357.6 |
| " | 1.191 | 1.07 | 5.58 | 57.3 | 326.4 |
| " | 1.183 | 2.22 | 5.13 | 118.9 | 300.0 |
| " | 1.176 | 3.48 | 4.64 | 186.4 | 271.6 |
| " | 1.175 | 3.72 | 4.55 | 198.8 | 266.8 |
| 30 | ... | 0.0 | 6.16 | 0.0 | 360.3 |
| " | 1.166 | 4.77 | 4.26 | 255.4 | 249.0 |
| 45 | ... | 0.0 | 6.24 | 0.0 | 365.0 |
| " | ... | 6.02 | 4.0 | 322.1 | 233.9 |

SOLUBILITY OF SODIUM CHLORIDE IN AQUEOUS SOLUTIONS OF HYDROCHLORIC ACID.

(Engel — Ann. chim. phys. [6] 13, 374, '88; Enklaar — Rec. trav. chim. 20, 183, '01.)

| At 0° (Engel.) | | | At 10°–10.5° (Enklaar.) | | | | | |
|----------------------|-------|----------------------|-------------------------|-------|------------------|-------|------------------|-------|
| Mg. Mols. per 10 cc. | | Sp. Gr. of Solution. | Gms. per Liter. | | Mols. per Liter. | | Grams per Liter. | |
| HCl. | NaCl. | | HCl. | NaCl. | HCl. | NaCl. | HCl. | NaCl. |
| 0.0 | 54.7 | 1.207 | 0.0 | 32.0 | 0.0 | 6.11 | 0.0 | 35.77 |
| 1.0 | 53.5 | 1.204 | 0.365 | 31.3 | 0.27 | 5.77 | 9.84 | 33.76 |
| 1.85 | 52.2 | 1.202 | 0.674 | 30.5 | 0.35 | 5.67 | 12.76 | 33.19 |
| 5.1 | 48.5 | 1.196 | 1.859 | 28.4 | 0.43 | 5.59 | 15.68 | 32.71 |
| 9.28 | 44.0 | 1.185 | 3.38 | 25.7 | 0.57 | 5.43 | 20.78 | 31.77 |
| 15.05 | 37.9 | 1.173 | 5.49 | 22.2 | 0.72 | 5.28 | 26.06 | 30.89 |
| 30.75 | 23.5 | 1.141 | 11.20 | 13.7 | 2.60 | 3.42 | 94.77 | 20.01 |
| 56.35 | 6.1 | 1.119 | 20.54 | 3.6 | 2.80 | 3.18 | 102.1 | 19.04 |
| | | | | | 3.31 | 2.74 | 120.6 | 16.03 |

SOLUBILITY OF MIXTURES OF SODIUM CHLORIDE AND OTHER SALTS IN WATER, ETC.

| Solvent. | t°. | Gms. per 100 Gms. Solvent. | | Authority. |
|---------------|-----|---------------------------------|---------------------------|--|
| | | NaCl + 22.1 NH ₄ Cl* | | |
| Water | 17 | 26.4 | | (Karsten.) |
| " | 17 | 34.5 | " + 4.1 BaCl ₂ | " |
| " | ? | 38.3 | " + 29.5 KNO ₃ | " |
| " | 25 | 38.5 | " + 41.14 " | (Soch — J. Physic. Ch. 2, 46, '98.) |
| " | 80 | 39.81 | " + 168.8 " | " |
| Alcohol (40%) | 25 | 15.78 | " + 13.74 " | " |
| Water | 20 | 30.54 | " + 13.95 KCl | (Quoted by Euler — Z. physik. Ch. 49, 315, '04.) |
| " | 25 | 28.90 | " + 16.12 " | |

* Sp. Gr. of solution at 17° = 1.179.

SOLUBILITY OF MIXTURES OF SODIUM CHLORIDE AND POTASSIUM SULPHATE IN WATER AT VARIOUS TEMPERATURES.

(Precht and Wittgen — Ber. 15, 1666, '82.)

| t°. | Grams per 100 Grams H ₂ O. | | | t°. | Grams per 100 Grams H ₂ O. | | |
|-----|---------------------------------------|--------------------------------|-----|-----|---------------------------------------|--------------------------------|-----|
| | NaCl | K ₂ SO ₄ | KCl | | NaCl | K ₂ SO ₄ | KCl |
| 10 | 33.4 | 8.1 | 3.2 | 60 | 36.4 | 11.9 | 2.7 |
| 20 | 34.0 | 8.9 | 3.1 | 70 | 36.6 | 12.8 | 3.2 |
| 30 | 34.6 | 9.6 | 2.9 | 80 | 36.0 | 12.3 | 5.1 |
| 40 | 35.2 | 10.4 | 2.8 | 90 | 35.9 | 12.4 | 7.0 |
| 50 | 35.8 | 11.1 | 2.8 | 100 | 35.6 | 12.6 | 8.8 |

SOLUBILITY OF SODIUM CHLORIDE IN AQUEOUS SOLUTIONS OF SODIUM BICARBONATE SATURATED WITH CO₂.

(Fedotieff.)

| t°. | Wt. of 1 cc. Solution. | Mols. per 1000 Gms. H ₂ O. | | Grams per 10000 Gms. H ₂ O. | |
|-----|------------------------|---------------------------------------|-------|--|-------|
| | | NaHCO ₃ . | NaCl. | NaHCO ₃ . | NaCl. |
| 0 | ... | 0.0 | 6.09 | 0.0 | 356.3 |
| " | 1.208 | 0.09 | 6.0 | 7.7 | 350.1 |
| 15 | 1.203 | 0.0 | 6.12 | 0.0 | 357.6 |
| " | 1.203 | 0.12 | 6.06 | 10.0 | 354.6 |
| 30 | 1.196 | 0.0 | 6.16 | 0.0 | 360.3 |
| " | 1.199 | 0.17 | 6.12 | 13.9 | 358.1 |
| 45 | 1.189 | 0.0 | 6.24 | 0.0 | 356.0 |
| " | 1.198 | 0.23 | 6.18 | 0.23 | 361.5 |

SOLUBILITY OF SODIUM CHLORIDE IN AQUEOUS SODIUM HYDROXIDE SOLUTIONS.

(Engel; Winteler — Z. Electrochem. 7, 360, '00.)

At 0° (Engel).

At 20° (Winteler).

| Mg. Mols. per 10 cc. | | Sp. Gr. of Solutions. | Grams per Liter. | | Gms. per Liter | | Sp. Gr. of Solutions. |
|----------------------|-------|-----------------------|------------------|-------|----------------|-------|-----------------------|
| NaOH. | NaCl. | | NaOH. | NaCl. | NaOH. | NaCl. | |
| 0 | 54.7 | 1.207 | 0.0 | 320.0 | 10 | 308 | 1.200 |
| 4.8 | 49.38 | 1.221 | 38.4 | 288.9 | 50 | 297 | 1.230 |
| 6.73 | 47.21 | 1.225 | 53.8 | 276.2 | 100 | 253 | 1.250 |
| 10.41 | 42.38 | 1.236 | 183.2 | 247.9 | 150 | 213 | 1.270 |
| 14.78 | 39.55 | 1.249 | 118.2 | 231.4 | 200 | 139 | 1.305 |
| 30.50 | 24.95 | 1.295 | 244.0 | 146.0 | 300 | 112 | 1.330 |
| 37.88 | 19.30 | 1.314 | 303.0 | 112.9 | 400 | 61 | 1.375 |
| 53.25 | 9.41 | 1.362 | 426.0 | 55.0 | 500 | 30 | 1.425 |
| | | | | | 640 | 18 | 1.490 |

SOLUBILITY OF SODIUM CHLORIDE IN AQUEOUS SOLUTIONS OF SODIUM NITRATE AND VICE VERSA.

(Bodländer — Z. physik. Ch. 7, 361, '91; Nicol — Phil. Mag. [5] 31, 369, '91; results at 25° by Soch — J. Physic. Ch. 2, 46, '98.)

NaCl in Aqueous NaNO₃.NaNO₃ in Aqueous NaCl.

Results at 15.5° (B.).

Results at 15° (B.).

| Sp. Gr. of Solutions. | Gms. per 100 cc. Sat. Solution. | | | Sp. Gr. of Solutions. | Gms. per 100 cc. Sat. Solution. | | |
|-----------------------|---------------------------------|-------------------|--------|-----------------------|---------------------------------|-------------------|---------------------|
| | NaNO ₃ . | H ₂ O. | NaCl. | | NaCl. | H ₂ O. | NaNO ₃ . |
| 1.2025 | 0 | 88.47 | 31.78 | 1.3720 | 0 | 74.82 | 62.38 |
| 1.2305 | 7.53 | 87.63 | 27.89 | 1.3645 | 4.0 | 75.69 | 56.76 |
| 1.2580 | 13.24 | 86.25 | 26.31 | 1.3585 | 7.24 | 75.71 | 52.09 |
| 1.2810 | 21.58 | 82.66 | 23.98 | 1.3530 | 11.36 | 76.86 | 47.08 |
| 1.3090 | 28.18 | 80.42 | 22.30 | 1.3495 | 15.33 | 76.96 | 42.66 |
| 1.3345 | 33.80 | 79.25 | 20.40 | 1.3485 | 17.81 | 77.14 | 39.90 |
| 1.3465 | 37.88* | 77.37 | 19.40* | 1.3485 | 18.97* | 77.15 | 38.73* |
| 1.3465 | 37.64* | 77.34 | 19.67* | 1.3485 | 19.34* | 77.49 | 38.02* |

Results at 20° (N.).

| Grams per 100 Grams H ₂ O. | | | | Grams per 100 Grams H ₂ O. | | | |
|---------------------------------------|-------------------|--------|------|---------------------------------------|------|-------|-------------------|
| 0 | NaNO ₃ | 35.91 | NaCl | 0 | NaCl | 87.65 | NaNO ₃ |
| 14.17 | " | 32.82 | " | 6.5 | " | 77.34 | " |
| 28.33 | " | 29.78 | " | 13.0 | " | 68.50 | " |
| 42.50 | " | 26.91 | " | 19.5 | " | 60.49 | " |
| 54.63* | " | 24.92* | " | | | | |

100 gms. H₂O dissolve 43.66* gms. NaNO₃ + 26.58* gms. NaCl at 25°.

100 gms. H₂O dissolve 121.6* gms. NaNO₃ + 17.62* gms. NaCl at 80°.

100 gms. aq. alcohol of 40 wt. per cent dissolve 22.78 gms. NaNO₃ + 10.17 gms. NaCl at 25°.

* Indicates solutions saturated with both salts.

SOLUBILITY OF SODIUM CHLORIDE IN ALCOHOLS.

(At 18.5°, de Bruyn — Z. physik. Ch. 10, 782, '92; Rohland — Z. anorg. Ch. 18, 327, '98.)

| t°. | Alcohol. | Gms. NaCl per 100 Gms. Alcohol. | t°. | Alcohol | Gms. NaCl per 100 Gms. Alcohol |
|------|-------------|---------------------------------------|------------|-----------------|--------------------------------------|
| 18.5 | Abs. Methyl | 1.41 | room temp. | Methyl d_{15} | = 0.799 1.33 |
| " | " Ethyl | 0.065 | " | Ethyl d_{15} | = 0.81 0.176 |
| | | | " | Propyl d_{15} | = 0.816 0.033 |

SOLUBILITY OF SODIUM CHLORIDE IN AQUEOUS ETHYL ALCOHOL SOLUTIONS.

(Bodländer — Z. physik. Ch. 7, 317, '91; Taylor — J. Phys. Ch. 1, 723, '97; also Bathrick — *Ibid.* 1, 150, '96.)

Results at 11.5° (B.).

| Sp. Gr. of Solutions. | Gms. per 100 cc. Solution. | | |
|--------------------------|-----------------------------------|-------------------|-------|
| | C ₂ H ₅ OH. | H ₂ O. | NaCl. |
| 1.2035 | 0 | 86.62 | 31.73 |
| 1.1865 | 2.86 | 86.14 | 29.66 |
| 1.1710 | 5.41 | 83.93 | 27.77 |
| 1.1548 | 7.93 | 81.50 | 26.05 |
| 1.1350 | 10.84 | 78.78 | 24.28 |
| 1.1390 | 11.22 | 78.62 | 23.65 |
| 1.1088 | 16.85 | 73.40 | 20.63 |

Results at 13° (B.).

| Sp. Gr. of Solutions. | Gms. per 100 cc. Solution. | | |
|--------------------------|-----------------------------------|-------------------|-------|
| | C ₂ H ₅ OH. | H ₂ O. | NaCl. |
| 1.2030 | 0 | 88.70 | 31.60 |
| 1.1348 | 11.81 | 78.41 | 23.26 |
| 1.1144 | 15.99 | 74.64 | 20.81 |
| 1.0970 | 19.39 | 71.45 | 18.86 |
| 1.0698 | 24.95 | 69.80 | 16.23 |
| 1.0295 | 32.33 | 57.96 | 12.66 |
| 0.9880 | 40.33 | 49.34 | 9.13 |
| 0.9445 | 49.28 | 38.54 | 5.93 |
| 0.9075 | 57.91 | 29.37 | 3.47 |
| 0.8700 | 63.86 | 21.62 | 1.52 |
| 0.8400 | 72.26 | 11.24 | 0.50 |

Results at 30° and at 40° (T.).

| Wt. per cent Alcohol in Solvent. | At 30°, Gms. NaCl per 100 Gms. | | At 40°, Gms. NaCl per 100 Gms. | |
|-------------------------------------|--------------------------------|--------|--------------------------------|--------|
| | Solution. | Water. | Solution. | Water. |
| 0 | 26.50 | 36.05 | 26.68 | 36.38 |
| 5 | 24.59 | 34.29 | 24.79 | 34.69 |
| 10 | 22.66 | 32.57 | 22.90 | 33.00 |
| 20 | 19.05 | 29.40 | 19.46 | 30.20 |
| 30 | 15.67 | 26.53 | 16.02 | 27.25 |
| 40 | 12.45 | 23.70 | 12.75 | 24.37 |
| 50 | 9.34 | 20.60 | 9.67 | 21.42 |
| 60 | 6.36 | 16.96 | 6.65 | 17.82 |
| 70 | 3.36 | 12.75 | 3.87 | 13.10 |
| 80 | 1.56 | 7.95 | 1.69 | 8.68 |
| 90 | 0.43 | 4.30 | 0.50 | 5.10 |

100 gms. alcohol of 0.9282 Sp. Gr. = 54.0% by wt. dissolve at:

| | | | | | | | | |
|------|------|-------|------|------|------|------|------|----------------|
| 4° | 10° | 13° | 23° | 32° | 33° | 44° | 51° | 60° |
| 10.9 | 11.1 | 11.43 | 11.9 | 12.3 | 12.5 | 13.1 | 13.8 | 14.1 gms. NaCl |

(Gerardin — Ann. chim. phys. [4] 5, 146, '56.)

100 gms. of a mixture of equal parts of 96% alcohol and 98% ether dissolve 0.11 gm. NaCl.

(Mayer — Liebig's Ann. 98, 205, '56.)

SOLUBILITY OF SODIUM CHLORIDE IN AQUEOUS SOLUTIONS OF:

Acetone at 20°.

(Herz and Knoch — Z. anorg. Ch. 41, 318, '04.)

| cc. Acetone per 100 cc. Solvent. | NaCl per 100 cc. Solution. | |
|--|-------------------------------|--------|
| | Millimols. | Grams. |
| 0 | 537.9 | 31.47 |
| 10 | 464.6 | 27.18 |
| 20 | 394.8 | 23.10 |
| 30 | 330.1 | 19.32 |
| 32) Lower layer | 308.5 | 18.05 |
| 87) Upper layer | 7.7 | 0.45 |
| 88 | 7.3 | 0.43 |
| 90 | 4.3 | 0.25 |

Glycerine at 25°.

(H. and K. — *Ibid.* 45, 267, '05.)

| Wt. per cent Glycerine in Solvent. | NaCl per 100 cc. Solution. | | Sp. Gr. of Solution. |
|--|-------------------------------|--------|-------------------------|
| | Millimols. | Grams. | |
| 0.0 | 545.6 | 31.93 | 1.1960 |
| 13.28 | 501.1 | 29.31 | 1.2048 |
| 25.98 | 448.4 | 26.23 | 1.2133 |
| 45.36 | 370.2 | 21.66 | 1.2283 |
| 54.23 | 333.9 | 19.54 | 1.2381 |
| 83.84 | 220.8 | 12.91 | 1.2666 |
| 100.00* | 167.1 | 9.78 | 1.2964 |

*Sp. Gr. of Glycerine, 1.2592.

Impurities about 1.5%.

100 gms. sat. solution in glycol contain 31.7 gms. NaCl at 14.8°.

(de Coninck — Chem. Centralb. 76, II, 883, '05.)

100 gms. H₂O dissolve 236.3 gms. sugar + 42.3 gms. NaCl at 31.25°,
or 100 gms. sat. aq. solution contain 62.17 gms. sugar + 11.13 gms.
NaCl.

(Köhler — Z. Ver. Zuckerind. 47, 447, '97.)

SODIUM CHROMATES (Mono, Di, etc.)

SOLUBILITY IN WATER.

(Mylus and Funk — Wiss. Abh. p. 1. Reichsanstalt 3, 451, '00; see also Salkowski — Ber. 34, 1048, '01.)

Sodium Mono Chromate.

| t°. | Gms. Na ₂ CrO ₄ per 100 Gms. Solution. | Mols. Na ₂ CrO ₄ per 100 Mols H ₂ O. | Solid Phase. |
|------|---|--|--|
| 0 | 24.07 | 3.52 | Na ₂ CrO ₄ ·10H ₂ O |
| 10 | 33.41 | 5.55 | " |
| 18* | 40.10 | 7.43 | " |
| 18.5 | 41.65 | 7.94 | " |
| 19.5 | 44.78 | 9.01 | " |
| 21 | 47.40 | 10.00 | " |
| 25.6 | 46.08 | 9.52 | Na ₂ CrO ₄ ·4H ₂ O |
| 31.5 | 47.05 | 9.90 | " |
| 36 | 47.98 | 10.2 | " |
| 40 | 48.97 | 10.6 | " |
| 45 | 50.20 | 11.6 | " |
| 49.5 | 50.93 | 11.5 | " |
| 54.5 | 52.28 | 12.2 | " |
| 59.5 | 53.39 | 12.7 | " |
| 65 | 55.23 | 13.7 | Na ₂ CrO ₄ |
| 70 | 55.15 | 13.6 | " |
| 80 | 55.53 | 13.8 | " |
| 100 | 55.74 | 14.0 | " |

Sodium Di Chromate.

| t°. | Gms. Na ₂ Cr ₂ O ₇ per 100 Gms. Solution. | Mols. Na ₂ Cr ₂ O ₇ per 100 Mols. H ₂ O. | Solid Phase. |
|------|---|---|---|
| 0 | 61.98 | 11.2 | Na ₂ Cr ₂ O ₇ ·2H ₂ O |
| 17 | 63.82 | 12.1 | " |
| 18† | 63.92 | 12.16 | " |
| 34.5 | 67.36 | 14.2 | " |
| 52 | 71.76 | 17.4 | " |
| 72 | 76.9 | 22.8 | " |
| 81 | 79.8 | 27.1 | " |
| 93 | 81.19 | 29.6 | Na ₂ Cr ₂ O ₇ |
| 98 | 81.25 | 29.8 | " |

Sodium Tri Chromate.

| t°. | Gms. Na ₂ Cr ₃ O ₁₀ per 100 Gms. Solution. | Mols. Na ₂ Cr ₃ O ₁₀ per 100 Mols. H ₂ O. | Solid Phase. |
|-----|--|--|--|
| 0 | 80.03 | 19.9 | Na ₂ Cr ₃ O ₁₀ ·H ₂ O. |
| 15† | 80.44 | 20.4 | " |
| 18 | 80.60 | 20.56 | " |
| 55 | 82.68 | 23.7 | " |
| 99 | 85.78 | 29.9 | " |

*Sp. Gr. of sat. sol. at 18° = 1.432. †Sp. Gr. of sat. sol. at 18° = 2.059.

‡Sp. Gr. of sat. solution at 18° = 1.745.

Sodium Tetra Chromate.

| t°. | Gms. Na ₂ Cr ₂ O ₇ per 100 Gms. Solution. | Mols. Na ₂ Cr ₂ O ₇ per 100 Mols. H ₂ O. | Solid Phase. |
|-----|---|---|---|
| 0 | 72.96 | 10.5 | Na ₂ Cr ₂ O ₇ ·4H ₂ O |
| 16 | 74.19 | 11.2 | " |
| 18* | 74.60 | 11.27 | " |
| 22 | 76.01 | 12.3 | " |

Tetra Sodium Chromate.

| t°. | Gms. Na ₂ Cr ₂ O ₇ per 100 Gms. Solution. | Mols. Na ₂ Cr ₂ O ₇ per 100 Mols. H ₂ O. | Solid Phase. |
|------|---|---|--|
| 0 | 33.87 | 4.11 | Na ₂ Cr ₂ O ₇ ·13H ₂ O |
| 10 | 35.58 | 4.42 | " |
| 18† | 37.50 | 4.81 | " |
| 27.7 | 40.09 | 5.38 | " |
| 37 | 45.13 | 6.62 | " |

* Sp. Gr. of sat. solution at 18° = 1.926.

† Sp. Gr. of sat. solution at 18° = 1.446.

SOLUBILITY OF SODIUM CHROMATES IN WATER AT 30°.

(Schreinemaker — Z. physik. Ch. 55, 91, '06.)

Composition in weight per cent:

| Of Solution. | | Of Residue. | | Solid Phase. |
|---------------------|---------------------|---------------------|---------------------|--|
| %CrO ₃ . | %Na ₂ O. | %CrO ₃ . | %Na ₂ O. | |
| 0 | ±42 | ... | ... | NaOH·H ₂ O |
| 2.00 | 41.44 | 5.83 | 42.64 | NaOH·H ₂ O + Na ₂ CrO ₄ |
| 2.04 | 40.89 | ... | ... | Na ₂ CrO ₄ |
| 4.23 | 35.51 | 27.52 | 36.57 | " |
| 6.64 | 32.34 | 27.72 | 34.60 | " |
| 15.19 | 27.06 | 37.07 | 32.20 | " |
| 10.22 | 29.39 | 15.48 | 28.41 | Na ₂ CrO ₄ + Na ₂ Cr ₂ O ₇ ·13H ₂ O |
| 8.93 | 28.49 | 18.09 | 26.89 | Na ₂ Cr ₂ O ₇ ·13H ₂ O |
| 8.62 | 26.91 | ... | ... | " |
| 13.12 | 23.91 | 18.57 | 25.92 | " |
| 18.44 | 22.86 | ... | ... | " |
| 19.26 | 22.98 | 21.54 | 25.31 | Na ₂ Cr ₂ O ₇ ·13H ₂ O + Na ₂ CrO ₄ ·4H ₂ O |
| 17.84 | 24.21 | 26.24 | 24.98 | Na ₂ CrO ₄ ·4H ₂ O |
| 28.82 | 17.88 | 31.97 | 23.47 | " |
| 38.93 | 16.30 | 40.70 | 20.83 | " |
| 48.70 | 16.49 | 47.49 | 19.75 | Na ₂ CrO ₄ ·4H ₂ O + Na ₂ Cr ₂ O ₇ ·2H ₂ O |
| 50.68 | 15.72 | ... | ... | Na ₂ Cr ₂ O ₇ ·2H ₂ O |
| 58.08 | 13.89 | 62.76 | 17.38 | " |
| 66.13 | 13.70 | 69.48 | 16.06 | Na ₂ Cr ₂ O ₇ ·2H ₂ O + Na ₂ Cr ₂ O ₁₀ ·H ₂ O |
| 65.98 | 14.15 | 69.46 | 15.15 | Na ₂ Cr ₂ O ₁₀ ·H ₂ O |
| 68.46 | 10.95 | 73.88 | 13.38 | Na ₂ Cr ₂ O ₁₀ ·H ₂ O + Na ₂ Cr ₄ O ₁₃ ·4H ₂ O |
| 66.88 | 9.85 | 71.27 | 10.67 | Na ₂ Cr ₂ O ₁₃ ·4H ₂ O |
| 70.06 | 11.85 | 83.95 | 9.57 | " (?) |
| 69.04 | 11.04 | 81.80 | 6.43 | CrO ₃ |
| 67.84 | 9.81 | 82.85 | 5.42 | " |
| 64.48 | 4.51 | 79.49 | 2.71 | " |
| 62.28 | 0.0 | 100.00 | ... | " |

100 gms. of a saturated aqueous solution contain at 30°:

46.627 gms. Na₂CrO₄, or 100 gms. H₂O dissolve 87.36 gms. Na₂CrO₄.66.4 gms. Na₂Cr₂O₇, or 100 gms. H₂O dissolve 197.6 gms. Na₂Cr₂O₇.100 gms. absolute methyl alcohol dissolve 0.345 gm. Na₂CrO₄ at 25°.

(de Bruyn — Z. physik. Ch. 10, 783, '92.)

SODIUM CITRATE $2C_3H_4(OH)(COONa)_3 \cdot 11H_2O$.

100 gms. H_2O dissolve 90.9 gms. citrate at 25° , and 250 gms. at b. pt.
(U.S.P.)

SODIUM (Ferro) CYANIDE $Na_4Fe(CN)_6$.

SOLUBILITY IN WATER.

(Conroy — J. Soc. Chem. Ind. 17, 104, '98.)

| t° | 20° | 42° | 80° | 98.5° |
|---|------------|------------|------------|--------------|
| Gms. $Na_4Fe(CN)_6$ per 100 gms. H_2O | 17.9 | 30.2 | 59.2 | 63.0 |

SODIUM FORMATE $HCOONa$. SOLUBILITY IN WATER.

(Groschuff — Ber. 36, 1788, '03.)

| t° | Gms. $HCOONa$ per 100 Gms. Solution. | Mols. $HCOONa$ per 100 Mols. H_2O . | Solid Phase. | t° | Gms. $HCOONa$ per 100 Gms. Solution. | Mols. $HCOONa$ per 100 Mols. H_2O . | Solid Phase. |
|-----------|--------------------------------------|---------------------------------------|----------------------|-----------|--------------------------------------|---------------------------------------|----------------------|
| -20 | 22.80 | 7.82 | $HCOONa \cdot 3H_2O$ | 25.5 | 50.53 | 27.0 | $HCOONa \cdot 2H_2O$ |
| 0 | 30.47 | 11.6 | " | 18 | 49.22 | 25.65 | $HCOONa$ |
| +15 | 41.88 | 19.1 | " | 29 | 50.44 | 26.9 | " |
| 18 | 44.92 | 21.6 | " | 54 | 53.80 | 30.8 | " |
| 18 | 44.73 | 21.4 | $HCOONa \cdot 2H_2O$ | 74.5 | 56.82 | 34.8 | " |
| 21 | 46.86 | 23.3 | " | 100.5 | 61.54 | 42.35 | " |
| 23 | 48.22 | 24.65 | " | 123 | 66.20 | 51.8 | " |

Sp. Gr. of the saturated solution of the dihydrate at $18^\circ = 1.317$.

SOLUBILITY OF SODIUM ACID FORMATE (EXPRESSED AS NEUTRAL SALT) IN AQUEOUS SOLUTIONS OF FORMIC ACID.

(Groschuff.)

| t° | Gms. $HCOONa$ per 100 Gms. Solution. | Mols. $HCOONa$ per 100 Mols. H_2O . | Solid Phase. | t° | Gms. $HCOONa$ per 100 Gms. Solution. | Mols. $HCOONa$ per 100 Mols. H_2O . | Solid Phase. |
|-----------|--------------------------------------|---------------------------------------|----------------------|-----------|--------------------------------------|---------------------------------------|--------------|
| 0 | 22.35 | 19.5 | $HCOONa \cdot HCOOH$ | 45.5 | 38.85 | 43.1 | $HCOONa$ |
| 25.5 | 29.62 | 28.45 | " | 70 | 41.27 | 47.5 | " |
| 66.5 | 41.08 | 47.1 | " | 85 | 43.09 | 51.2 | " |

SODIUM FLUORIDE NaF .

100 gms. sat. aq. solution contain 4.3 gms. NaF at 18° . Sp. Gr. of solution = 1.044.

(Mylius and Funk — Ber. 30, 1718, '97.)

SOLUBILITY OF SODIUM FLUORIDE IN AQUEOUS SOLUTIONS OF HYDROFLUORIC ACID AT 21° .

(Ditte — Compt. rend. 123, 1282, '96.)

| Grams per 1000 Grams H_2O . | | Grams per 1000 Grams H_2O . | |
|-------------------------------|----------|-------------------------------|----------|
| 0.0 HF | 41.7 NaF | 83.8 HF | 22.9 NaF |
| 10.0 " | 41.4 " | 129.7 " | 23.8 " |
| 45.8 " | 22.5 " | 596.4 " | 48.8 " |
| 56.5 " | 22.7 " | 777.4 " | 81.7 " |

SODIUM FLUO SILICATE Na_2SiF_6 .

100 gms. H_2O dissolve 0.65 gm. at 17.5° , and 2.45 gms. at 100° .

(Stolba — Z. anal. Ch. 11, 199, '72.)

SODIUM HYDROXIDE

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SODIUM HYDROXIDE NaOH.

SOLUBILITY IN WATER.

(Pickering — J. Ch. Soc. 63, 890, '93; Mylius and Funk (Dietz) — Wiss. Abh. p. t. Reichsanstalt 3, 450, '00.)

| t°. | Gms. NaOH per 100 Gms. | | Solid Phase | t°. | Gms. NaOH per 100 Gms. | | Solid Phase. |
|--------|---------------------------|--------|--|------|---------------------------|--------|---------------------------------|
| | Solution. | Water. | | | Solution. | Water. | |
| — 7.8 | 8.0 | 8.7 | Ice | 20 | 52.2 | 109 | NaOH.H ₂ O |
| — 20 | 16.0 | 19.1 | " | 30 | 54.3 | 119 | " |
| — 28 | 19.0 | 23.5 | Ice + NaOH.7H ₂ O | 40 | 56.3 | 129 | " |
| — 24 | 22.2 | 28.5 | NaOH.7H ₂ O + NaOH.5H ₂ O | 50 | 59.2 | 145 | " |
| — 17.7 | 24.5 | 32.5 | NaOH.5H ₂ O + NaOH.4H ₂ O α | 60 | 63.5 | 174 | " |
| 0 | 29.6 | 42.0 | NaOH.4H ₂ O α | 64.3 | 69.0 | 222.3 | " f. pt. |
| + 5 | 32.2 | 47.5 | NaOH.4H ₂ O α + NaOH.3½H ₂ O | 61.8 | 74.2 | 288 | NaOH.H ₂ O + NaOH |
| 10 | 34.0 | 51.5 | NaOH.3½H ₂ O | 80 | 75.8 | 313 | NaOH (?) |
| 15.5 | 38.9 | 63.53 | " f. pt. | 110 | 78.5 | 365 | " |
| 5 | 45.5 | 83.5 | NaOH.3½H ₂ O + NaOH.2H ₂ O | 192 | 83.9 | 521 | " |
| 12 | 50.7 | 103.0 | NaOH.2H ₂ O + NaOH.H ₂ O | | | | |

Sp. Gr. of sat. solution at 18° = 1.539.

For determinations of the Sp. Gr. of sodium hydroxide solution, see Kohlrausch — Wied. Ann. 1, 1879; Wegschnider and Waller — Monatsh. Chem. 26, 685, '05.

SODIUM IODATE NaIO₃.

SOLUBILITY IN WATER.

(Gay-Lussac; Kremers — Pogg. Ann. 97, 5, '56.)

| t° | 0°. | 20°. | 40°. | 60° | 80°. | 100°. |
|--|-----|------|------|-----|------|-------|
| Gms. NaIO ₃ per 100 gms. H ₂ O | 2.5 | 9 | 15 | 21 | 27 | 34 |

SODIUM IODIDE NaI.2H₂O.

SOLUBILITY IN WATER.

(de Copper — Ann. chim. phys. [5] 30, 411, '83; see also Etard — Compt. rend. 98, 1434, '84; and Kremers — Pogg. Ann. 97, 14, '56.)

| t°. | Grams NaI per 100 Gms. | | Solid Phase. | t°. | Grams NaI per 100 Gms. | | Solid Phase |
|------|------------------------|-----------|-----------------------|-----|------------------------|-----------|-----------------------|
| | Water. | Solution. | | | Water. | Solution. | |
| — 20 | 148.0 | 59.7 | NaI.2H ₂ O | 60 | 256.8 | 72.0 | NaI.2H ₂ O |
| 0 | 158.7 | 61.4 | " | 65 | 278.4 | 73.6 | " |
| 10 | 168.6 | 62.8 | " | 67 | 293 | 74.6 | NaI |
| 20 | 178.7 | 64.1 | " | 70 | 294 | 74.6 | " |
| 25 | 184.2 | 64.8 | " | 80 | 296 | 74.7 | " |
| 30 | 190.3 | 65.6 | " | 100 | 302 | 75.1 | " |
| 40 | 205.0 | 67.2 | " | 120 | 310 | 75.6 | " |
| 50 | 227.8 | 69.5 | " | 140 | 321 | 76.3 | " |

SOLUBILITY OF SODIUM IODIDE IN SEVERAL SOLVENTS.

(At 22.5°, de Bruyn — Z. physik. Ch. 10, 783, '92; at ord. temp., Rohland — Z. anorg. Ch. 18, 327, '98; Walden — Z. physik. Ch. 55, 713, 718, '06.)

| Solvent. | t°. | Gms. NaI per 100 Gms. Solvent. | Solvent. | Gms. NaI per 100 Gms. Solution. | |
|--------------------------------------|------------|--------------------------------------|---------------|---------------------------------------|---------|
| | | | | at 0°. | at 25°. |
| Absolute Ethyl Alcohol | 22.5 | 43.1 | Acetonitril | 22.09 | 18.43 |
| d ₁₅ 0.810 Ethyl Alcohol | ord. temp. | 58.8 | Propionitril | 9.09 | 6.23 |
| Absolute Methyl Alcohol | 22.5 | 77.7 | Nitro Methane | 0.34 | 0.48 |
| d ₁₆ 0.799 Methyl Alcohol | ord. temp. | 83.3 | Acetone | very soluble | |
| d ₁₅ 0.816 Propyl Alcohol | ord. temp. | 26.3 | Furfural | ... | 25.10 |

SODIUM MOLYBDATE Na_2MoO_4 .

SOLUBILITY IN WATER.

(Funk — Ber. 33, 3697, '00.)

| t°. | Gms. Na_2MoO_4 per 100 Gms. Solution. | Mols. Na_2MoO_4 per 100 Mols. H_2O . | Solid Phase. | t°. | Gms. Na_2MoO_4 per 100 Gms. Solution. | Mols. Na_2MoO_4 per 100 Mols. H_2O . | Solid Phase. |
|-----|--|---|--|------|--|---|---|
| 0 | 30.63 | 3.86 | $\text{Na}_2\text{MoO}_4 \cdot 10\text{H}_2\text{O}$ | 15.5 | 39.27 | 5.65 | $\text{Na}_2\text{MoO}_4 \cdot 2\text{H}_2\text{O}$ |
| 4 | 33.83 | 4.47 | " | 18 | 39.40 | 5.70 | " |
| 6 | 35.58 | 4.83 | " | 32 | 39.82 | 5.78 | " |
| 9 | 38.16 | 5.39 | " | 51.5 | 41.27 | 6.14 | " |
| 10 | 39.28 | 5.65 | $\text{Na}_2\text{MoO}_4 \cdot 2\text{H}_2\text{O}$ | 100 | 45.57 | 7.32 | " |

100 gms. H_2O dissolve 3.878 gms. sodium tri molybdate $\text{Na}_2\text{Mo}_3\text{O}_{10}$ at 20°, and 13.7 gms. at 100°.

(Ullik — Liebig's Ann. 144, 244, '67.)

SODIUM NITRATE NaNO_3 .

SOLUBILITY IN WATER.

(Mulder; Berkeley — Trans. Roy. Soc. (Lond.) 203 A, 211, '04; see also Ditte — Compt. rend. 80, 1164, '75; Maumee — *Ibid.* 58, 81, '64; Etard — Ann. chim. phys. [7] 2, 527, '94.)

| t°. | Gms. NaNO_3 per 100 Gms. Solution. | Gms. Water. | Mols. per Liter. | t°. | Gms. NaNO_3 per 100 Gms. Solution. | Gms. Water. | Mols. per Liter. |
|-----|--|-------------|---------------------|-----------|--|--------------|---------------------|
| 0 | 42.2 | 72.9—73.0* | 6.71* | 80 | 59.7 | 148.0—148.0* | 10.35* |
| 10 | 44.7 | 80.8—80.5 | 7.16 | 100 | 64.3 | 180.0—175.8 | 11.30 |
| 20 | 46.7 | 87.5—88.0 | 7.60 | 120 | 68.6 | 218.0—208.8† | 12.22† |
| 25 | 47.6 | 91.0—92.0 | 7.80 | 180 | 78.1 | 356.7 | |
| 30 | 48.7 | 94.9—96.2 | 8.06 | 220 | 83.5 | 506.0 | |
| 40 | 50.5 | 102.0—104.9 | 8.51 | 225 | 91.5 | 1076.0 | |
| 50 | 52.8 | 112.0—114.0 | 8.97 | 313 m.pt. | 100.0 | ∞ | |
| 60 | 54.9 | 122.0—124.0 | 9.42 | ... | | | |

* Berkeley.

† 119°.

SOLUBILITY OF SODIUM NITRATE IN AQUEOUS SOLUTIONS OF
NITRIC ACID AT 0°.

(Engel — Compt. rend. 104, 911, '87; see also Schultz — Zeit. Ch. [2] 5, 531, '62.)

| Equivalents per 10 cc. Solution. | | Sp. Gr. of Solutions. | Grams per 100 cc. Solution. | |
|----------------------------------|------------------|--------------------------|-----------------------------|------------------|
| NaNO_3 . | HNO_3 . | | NaNO_3 . | HNO_3 . |
| 66.4 | 0 | 1.341 | 56.5 | 0.00 |
| 63.7 | 2.65 | 1.338 | 54.2 | 1.67 |
| 60.5 | 5.7 | 1.331 | 51.48 | 3.59 |
| 56.9 | 8.8 | 1.324 | 48.42 | 5.55 |
| 52.75 | 12.57 | 1.312 | 44.88 | 7.92 |
| 48.7 | 16.9 | 1.308 | 41.44 | 10.65 |
| 39.5 | 27.0 | 1.291 | 33.61 | 17.02 |
| 35.1 | 32.25 | 1.285 | 29.86 | 20.33 |
| 31.1 | 37.25 | 1.282 | 26.46 | 23.48 |
| 23.5 | 48.0 | 1.276 | 20.0 | 30.26 |
| 18.0 | 57.25 | 1.276 | 15.32 | 36.09 |
| 12.9 | 71.0 | 1.291 | 10.97 | 44.76 |

SOLUBILITY OF MIXTURES OF SODIUM NITRATE AND POTASSIUM NITRATE IN WATER AT 20°.

(Carnelly and Thomson — J. Ch. Soc. 53, 799, '88.)

| Per cent NaNO ₃ in Mixtures Used. | Gms. per 100 Gms. H ₂ O. | | Per cent NaNO ₃ in Mixtures Used. | Gms. per 100 Gms. H ₂ O. | |
|---|--|--------------------|---|--|--------------------|
| | NaNO ₃ . | KNO ₃ . | | NaNO ₃ . | KNO ₃ . |
| 100 | 86.8 | 0 | 45.7 | 53.3 | 34.7 |
| 90 | 96.4 | 13.2 | 40 | 45.6 | 35.5 |
| 80 | 98.0 | 38.5 | 20 | 20.8 | 33.3 |
| 60 | 90.0 | 47.6 | 10 | 9.4 | 31.5 |
| 50 | 66.0 | 40.0 | 0 | 0.0 | 33.6 |

100 gms. H₂O dissolve 24.9 gms. NaCl + 53.6 gms. NaNO₃ at 20°.

(Rüddorf — Ber. 6, 484, '73; Karsten; Nicol — Phil. Mag. [5] 31, 386, '91.)

SOLUBILITY OF SODIUM NITRATE IN AQUEOUS SOLUTIONS OF SODIUM HYDROXIDE AT 0°.

(Engel — Bull. soc. chim. [3] 6, 16, '91.)

| Milligram Mols. per 10 cc. Solution. | | Sp. Gr. of Solutions. | Grams per 100 cc. Solution. | |
|---|---------------------|-----------------------------|--------------------------------|---------------------|
| NaOH. | NaNO ₃ . | | NaOH. | NaNO ₃ . |
| 0.0 | 66.4 | 1.341 | 0.0 | 56.50 |
| 2.875 | 62.5 | 1.338 | 2.30 | 53.19 |
| 6.1 | 57.15 | 1.333 | 4.89 | 48.63 |
| 12.75 | 47.5 | 1.327 | 10.21 | 40.42 |
| 26.0 | 29.5 | 1.326 | 20.83 | 25.10 |
| 39.0 | 17.5 | 1.332 | 31.25 | 14.89 |
| 45.88 | 13.19 | 1.356 | 36.76 | 11.22 |
| 60.88 | 6.05 | 1.401 | 48.75 | 5.15 |

SOLUBILITY OF SODIUM NITRATE IN ALCOHOLS.

100 gms. abs. methyl alcohol dissolve 0.41 gm. NaNO₃ at 25°.100 gms. abs. ethyl alcohol dissolve 0.036 gm. NaNO₃ at 25°.

(de Bruyn — Z. physik. Ch. 10, 783, '92.)

SOLUBILITY OF SODIUM NITRATE IN AQUEOUS ETHYL ALCOHOL AT DIFFERENT TEMPERATURES.

(Bodländer — Z. physik. Ch. 7, 317, '91; Taylor — J. Physic. Ch. 1, 723, '97; Bathrick — *Ibid.* 1, 162, '96.)

Results at 13° (B.).

| Sp. Gr. of Solutions. | Gms. per 100 cc. Solution. | | |
|--------------------------|-----------------------------------|-------------------|---------------------|
| | C ₂ H ₅ OH. | H ₂ O. | NaNO ₃ . |
| 1.3700 | 0.0 | 75.34 | 61.66 |
| 1.3395 | 3.08 | 73.53 | 57.34 |
| 1.3120 | 6.01 | 71.81 | 53.39 |
| 1.2845 | 8.30 | 70.85 | 49.30 |
| 1.2580 | 10.91 | 69.47 | 45.42 |
| 1.2325 | 13.77 | 67.12 | 42.36 |
| 1.2010 | 16.46 | 66.16 | 37.48 |

Results at 16.5° (B.).

| Sp. Gr. of Solutions. | Gms. per 100 cc. Solution. | | |
|--------------------------|-----------------------------------|-------------------|---------------------|
| | C ₂ H ₅ OH. | H ₂ O. | NaNO ₃ . |
| 1.3745 | 0.0 | 75.25 | 62.20 |
| 1.3162 | 6.16 | 70.82 | 54.64 |
| 1.2576 | 11.60 | 68.10 | 46.06 |
| 1.2140 | 16.49 | 65.04 | 39.87 |
| 1.1615 | 22.17 | 61.67 | 32.31 |
| 1.0855 | 32.22 | 52.92 | 23.41 |
| 1.0558 | 37.23 | 48.50 | 19.85 |
| 1.0050 | 43.98 | 42.78 | 13.74 |
| 0.9420 | 52.60 | 32.13 | 9.47 |
| 0.9030 | 60.00 | 25.65 | 4.65 |
| 0.8610 | 63.16 | 21.31 | 1.63 |

Results at 30° (T.).

| Wt. per cent Alcohol in Solvent. | Gms. NaNO ₃ per 100 Gms. | |
|--|--|--------|
| | Solution. | Water. |
| 0 | 49.10 | 96.45 |
| 5 | 46.41 | 91.15 |
| 10 | 43.50 | 85.55 |
| 20 | 37.42 | 74.75 |
| 30 | 31.31 | 65.10 |
| 40 | 25.14 | 55.95 |
| 50 | 18.94 | 46.75 |
| 60 | 12.97 | 37.25 |
| 70 | 7.81 | 28.25 |
| 90 | 1.21 | 12.25 |

Results at 40°.

(Bathrick.)

| Wt. per cent Alcohol. | Gms. NaNO ₃ per 100 Gms. Aq. Alcohol. |
|-----------------------------|--|
| 0 | 104.5 |
| 8.22 | 90.8 |
| 17.4 | 73.3 |
| 26.0 | 61.6 |
| 36.0 | 48.4 |
| 42.8 | 40.6 |
| 55.3 | 27.1 |
| 65.1 | 18.1 |
| 77.0 | 9.4 |
| 87.2 | 4.2 |

SOLUBILITY OF SODIUM NITRATE IN AQUEOUS SOLUTIONS OF ACETONE.

Results at 30°.

(Taylor.)

| Wt. per cent Acetone in Solvent. | Gms. NaNO ₃ per 100 Gms. | |
|--|--|--------|
| | Solution. | Water. |
| 0 | 49.10 | 96.45 |
| 5 | 46.96 | 93.20 |
| 9.09 | 45.11 | 90.40 |
| 20 | 40.10 | 83.70 |
| 30 | 35.08 | 77.20 |
| 40 | 29.80 | 70.75 |
| 50 | 24.34 | 64.40 |
| 60 | 18.55 | 59.95 |
| 70 | 13.15 | 50.50 |
| 80 | 7.10 | 38.20 |
| 90 | 1.98 | 20.20 |

Results at 40°.

(Bathrick.)

| Wt. per cent Acetone. | Gms. NaNO ₃ per 100 Gms. Aq. Acetone. |
|-----------------------------|--|
| 0.0 | 105 |
| 8.47 | 91.2 |
| 16.8 | 78.3 |
| 25.2 | 66.4 |
| 34.3 | 57.9 |
| 44.1 | 46.2 |
| 53.9 | 32.8 |
| 64.8 | 23.0 |
| 76.0 | 10.8 |
| 87.6 | 3.2 |

SODIUM NITRITE NaNO₂.100 gms. H₂O dissolve 83.3 gms. at 15°.

(Divers — J. Ch. Soc. 75, 86, '99.)

100 gms. abs. methyl alcohol dissolve 4.43 gms. NaNO₂ at 19.5°.100 gms. abs. ethyl alcohol dissolve 0.31 gm. NaNO₂ at 19.5°.

(de Bruyn — Z. physik. Ch. 10, 783, '92.)

SODIUM RHODO NITRITE Na₂Rh₂(NO₂)₁₂.100 gms. H₂O dissolve 40 gms. at 17°, and 100 gms. at 100°.

(Leidie — Compt. rend. 111, 107, '90.)

SODIUM OXALATE C₂O₄Na₂.

SOLUBILITY IN WATER.

(Souclay and Leussen — Liebig's Ann. 90, 33, '56; Pohl — J. pr. Ch. 56, 216, '52.)

| °. | 15.5°. | 21.8°. | 100°. |
|--|--------|--------|-------|
| Gms. Na ₂ C ₂ O ₄ per 100 gms. H ₂ O | 3.22 | 3.74 | 6.33 |

SOLUBILITY OF MIXTURES OF SODIUM OXALATE AND OXALIC ACID IN WATER AT 25°.

(Foote and Andrew — Am. Ch. J. 34, 154, '05.)

| Gms. per 100 Gms. Solution. | | Mols. per 100 Mols. H ₂ O. | | Solid Phase. |
|--|---|--|---|--|
| H ₂ C ₂ O ₄ . | Na ₂ C ₂ O ₄ . | H ₂ C ₂ O ₄ . | Na ₂ C ₂ O ₄ . | |
| 10.20 | ... | 2.274 | ... | H ₂ C ₂ O ₄ .2H ₂ O |
| 10.50 | 0.83 | 2.370 | 0.130 | H ₂ C ₂ O ₄ .2H ₂ O + HNaC ₂ O ₄ .H ₂ O |
| 9.15 | 0.71 | 2.032 | 0.106 | |
| 6.88 | 0.86 | 1.493 | 0.125 | |
| 1.14 | 1.25 | 0.234 | 0.172 | |
| 0.47 | 3.20 | 0.098 | 0.446 | Double Salt, HNaC ₂ O ₄ .H ₂ O |
| 0.42 | 3.85 | 0.090 | 0.541 | HNaC ₂ O ₄ .H ₂ O + Na ₂ C ₂ O ₄ |
| ... | 3.60 | ... | 0.502 | |

SODIUM *p* NITRO PHENOL C₆H₄ONa(1).NO₂(4).

SOLUBILITY IN WATER AND IN AQUEOUS NORMAL SOLUTIONS OF NON ELECTROLYTES.

(Goldschmidt — Z. physik. Ch. 17, 154, '95.)

| t°. | Gms. C ₆ H ₄ ONa(1).NO ₂ (4) per 100 Gms. Solution in: | | | | | | |
|------|---|----------|--------|------------|----------|---------------|--------------|
| | Water. | Alcohol. | Urea. | Glycerine. | Acetone. | Propionitril. | Acetonitril. |
| 23.7 | 5.597 | 5.615 | 6.244 | 6.188 | 6.225 | 6.257 | 6.065 |
| 28.6 | 6.721 | 6.874 | 7.489 | 7.440 | 7.498 | 7.571 | 7.328 |
| 30.6 | 7.256 | ... | ... | ... | ... | ... | ... |
| 33.6 | 8.125 | 8.318 | 9.000 | 9.025 | 9.025 | 9.066 | 8.886 |
| 35.9 | 8.851 | ... | ... | ... | ... | ... | ... |
| 36.1 | 8.883 | ... | 9.683 | 9.688 | 9.665 | 9.911 | 9.667 |
| 40.2 | 9.881 | 10.147 | 10.666 | 10.777 | 10.695 | 10.905 | 10.667 |
| 45.2 | 11.235 | 11.513 | 12.068 | 12.229 | ... | ... | ... |
| 50.1 | 12.730 | 13.133 | 13.555 | 13.785 | ... | ... | ... |

The solid phase is C₆H₄ONa.NO₂.4H₂O below 36°, and C₆H₄ONa.NO₂.2H₂O above 36° in each case.

SODIUM PHOSPHATES, Ortho, Hydrogen, and Pyro.

SOLUBILITY OF EACH IN WATER.

(Mulder; Poggiale.)

| t°. | Gms. per 100 Gms. Water. | | | t°. | Gms. per 100 Gms. H ₂ O. | | |
|-----|-----------------------------------|------------------------------------|---|-----|-------------------------------------|------------------------------------|---|
| | Na ₃ PO ₄ . | Na ₂ HPO ₄ . | Na ₄ P ₂ O ₇ . | | Na ₃ PO ₄ . | Na ₂ HPO ₄ . | Na ₄ P ₂ O ₇ . |
| 0 | 1.5 | 2.5 | 3.16 | 40 | 31.0 | 63.9 | 13.50 |
| 10 | 4.1 | 3.9 | 3.95 | 50 | 43.0 | 82.5 | 17.45 |
| 20 | 11.0 | 9.3 | 6.23 | 60 | 55.0 | 91.6 | 21.83 |
| 25 | 15.5 | 15.4 | 8.14 | 80 | 81.0 | 96.6 | 30.04 |
| 30 | 20.0 | 24.1 | 9.95 | 100 | 108.0 | 99.0 | 40.26 |

Solid phases, Na₃PO₄.12H₂O, Na₂HPO₄.12H₂O and Na₄P₂O₇.10H₂O respectively. Sp. Gr. of saturated solution of Na₂HPO₄ at 15° = 1.047.

100 gms. alcohol of 0.941 Sp. Gr. dissolve 0.33 gm. sodium phosphate at 15.5°.

SODIUM (Double) PHOSPHATE, FLUORIDE Na₃PO₄.NaF.12H₂O.

100 gms. water dissolve 12 gms. of the double sodium salt at 25°, and 57.5 gms. at 70°. Sp. Gr. of solution at 25° = 1.0329; at 70° = 1.1091.

(Briegleb — Liebig's Ann. 97, 95, '86.)

SOLUBILITY OF SODIUM PHOSPHITES, ETC., IN WATER.

| Salt. | Formula. | t°. | Gms. Salt per 100 Gms. H ₂ O. | Authority. |
|------------------------|---|--------|--|---|
| Hydrogen Phosphite | (NaH)HPO ₃ .2½H ₂ O | 0 | 56 | } (Amat. — Compt. rend. 106, 1351, '88.) |
| " | " | 10 | 66 | |
| " | " | 42 | 193 | |
| Hypophosphate | Na ₂ P ₂ O ₆ .10H ₂ O | cold | 3.3 | } (Salzer — Liebig's Ann. 211, 1, '82.) |
| Hydrogen Hypophosphate | Na ₂ HP ₂ O ₆ .9H ₂ O | ? | 4.5 | |
| Tri Hydrogen | NaH ₂ P ₂ O ₆ .3H ₂ O | cold | 6.7 | |
| Di Hydrogen | Na ₂ H ₂ P ₂ O ₆ .6H ₂ O | cold | 2.2 | } (Salzer — Liebig's Ann. 187, 331, '77) |
| Di Hydrogen | Na ₂ H ₂ P ₂ O ₆ .6H ₂ O | b. pt. | 20.0 | |
| Hypophosphite | (NaH)HPO ₃ .H ₂ O | 25 | 100.0 | |
| Hypophosphite | (NaH)HPO ₃ .H ₂ O | b. pt. | 830 | (U. S. P.) |

SODIUM SELENATE Na₂SeO₄.10H₂O. SOLUBILITY IN WATER.

(Funk — Ber. 33, 3697, '00.)

| t°. | Gms. Na ₂ SeO ₄ per 100 Gms. Solution. | Mols. Na ₂ SeO ₄ per 100 Mols. H ₂ O. | Solid Phase. | t°. | Gms. Na ₂ SeO ₄ per 100 Gms. Solution. | Mols. Na ₂ SeO ₄ per 100 Mols. H ₂ O. | Solid Phase. |
|------|---|---|--|------|---|---|----------------------------------|
| 0 | 11.74 | 1.26 | Na ₂ SeO ₄ .10H ₂ O | 35.2 | 45.47 | 7.94 | Na ₂ SeO ₄ |
| 15 | 25.01 | 3.18 | " | 39.5 | 45.26 | 7.87 | " |
| 18 | 29.00 | 3.90 | " | 50 | 44.49 | 7.63 | " |
| 25.2 | 36.91 | 5.57 | " | 75 | 42.83 | 7.14 | " |
| 27 | 39.18 | 6.13 | " | 100 | 42.14 | 6.93 | " |
| 30 | 44.05 | 7.50 | " | | | | |

Sp. Gr. of saturated solution at 18° = 1.315.

SODIUM STANNATE Na₂SnO₃.3H₂O.

100 gms. H₂O dissolve 67.4 gms. at 0°, and 61.3 gms. at 20°. Sp. Gr. of solution at 0° = 1.472; at 20° = 1.438.

(Ordway — Am. J. Sci. [2] 40, 173, '65.)

SODIUM SULPHATE Na₂SO₄. SOLUBILITY IN WATER.

(Mulder; Löwel — Ann. chim. phys. [3] 33, 382, '51; Tilden and Shenstone — Proc. Roy. Soc. (Lond.) 35, 345, '83; Etard — Ann. chim. phys. [7] 2, 527, '94; Funk — Ber. 33, 3701, '00; Berkeley — Trans. Roy. Soc. (Lond.) 203 A, 209, '04.)

| t°. | Gms. Na ₂ SO ₄ per 100 Gms. | | Mols. Na ₂ SO ₄ per Liter (B.). | Solid Phase. | t°. | Gms. Na ₂ SO ₄ per 100 Gms. | | Mols. Na ₂ SO ₄ per Liter (B.). | Solid Phase. |
|-------|--|--------|---|---|-----|--|--------|---|--|
| | Solution. | Water. | | | | Solution. | Water. | | |
| 0 | 4.76 | 5.0 | 0.31 | Na ₂ SO ₄ .10H ₂ O | 50 | 31.8 | 46.7 | 2.92 | Na ₂ SO ₄ |
| 5 | 6.0 | 6.4 | ... | " | 60 | 31.2 | 45.3 | 2.83 | " |
| 10 | 8.3 | 9.0 | 0.631 | " | 80 | 30.4 | 43.7 | 2.69 | " |
| 15 | 11.8 | 13.4 | ... | " | 100 | 29.8 | 42.5 | 2.60 | " |
| 20 | 16.3 | 19.4 | 1.32 | " | 120 | 29.5 | 41.95 | ... | " |
| 25 | 21.9 | 28.0 | ... | " | 140 | 29.6 | 42 | ... | " |
| 27.5 | 25.6 | 34.0 | ... | " | 160 | 30.7 | 44.25 | ... | " |
| 30 | 29.0 | 40.8 | 2.63 | " | 230 | 31.7 | 46.4 | ... | " |
| 31 | 30.6 | 44.0 | ... | " | 0 | 16.3 | 19.5 | ... | Na ₂ SO ₄ .7H ₂ O |
| 32 | 32.3 | 47.8 | ... | " | 5 | 19.4 | 24 | ... | " |
| 32.75 | 33.6 | 50.65 | 3.11 | " | 10 | 23.1 | 30 | ... | " |
| 33 | 33.6 | 50.6 | ... | Na ₂ SO ₄ | 15 | 27.0 | 37 | ... | " |
| 35 | 33.4 | 50.2 | ... | " | 20 | 30.6 | 44 | ... | " |
| 40 | 32.8 | 48.8 | 3.01 | " | 25 | 34.6 | 53 | ... | " |

SOLUBILITY OF MIXTURES OF SODIUM SULPHATE AND MAGNESIUM
SULPHATE IN WATER (ASTRAKANITE) $\text{Na}_2\text{Mg}(\text{SO}_4)_2 \cdot 4\text{H}_2\text{O}$.

(Roozeboom — Rec. trav. chim. 6, 342, '87; Z. physik. Ch. 2, 518, '88.)

| t°. | Mols. per 100 Mols. H_2O . | | Grams per 100 Grams H_2O . | | Solid Phase. |
|------|---|-------------------|---|-------------------|--|
| | Na_2SO_4 . | MgSO_4 . | Na_2SO_4 . | MgSO_4 . | |
| 22 | 2.95 | 4.70 | 23.3 | 31.4 | Astrakanite |
| 24.5 | 3.45 | 3.68 | 27.2 | 24.6 | " |
| 30 | 3.59 | 3.59 | 28.4 | 24.1 | " |
| 35 | 3.71 | 3.71 | 29.4 | 24.8 | " |
| 47 | 3.6 | 3.6 | 28.4 | 24.1 | " |
| 22 | 2.95 | 4.70 | 23.3 | 31.4 | Astrakanite + Na_2SO_4 |
| 24.5 | 3.45 | 3.62 | 27.2 | 24.2 | " |
| 30 | 4.58 | 2.91 | 36.1 | 19.1 | " |
| 35 | 4.3 | 2.76 | 33.9 | 18.44 | " |
| 18.5 | 3.41 | 4.27 | 43.0 | 45.5 | Astrakanite + MgSO_4 |
| 22 | 2.85 | 4.63 | 35.2 | 48.9 | " |
| 24.5 | 2.68 | 4.76 | 32.5 | 50.3 | " |
| 30 | 2.3 | 5.31 | 25.9 | 55.0 | " |
| 35 | 1.73 | 5.88 | 23.5 | 59.4 | " |

SOLUBILITY OF MIXTURES OF SODIUM SULPHATE, POTASSIUM
CHLORIDE, POTASSIUM SULPHATE, ETC., IN WATER.

(Meyerhoffer and Saunders — Z. physik. Ch. 28, 469; 31, 382, '90.)

| t°. | Sp. Gr. of Solutions. | Mols. per 1000 Mols. H_2O . | | | | Solid Phase. |
|-------|--------------------------|---|--------------|---------------|---------------|---|
| | | SO_4 | K_2 | Na_2 | Cl_2 | |
| *4.4 | ... | 5.42 | 14.39 | 51.83 | 60.8 | $\text{K}_2\text{Na}(\text{SO}_4)_2 + \text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O} + \text{KCl} + \text{NaCl}$ |
| 0.2 | ... | 3.35 | 12.78 | 50.93 | 60.36 | $\text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O} + \text{KCl} + \text{NaCl}$ |
| -0.4 | ... | 3.59 | 16.38 | 40.75 | 53.54 | $\text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O} + \text{KCl} + \text{K}_2\text{Na}(\text{SO}_4)_2$ |
| 16.3 | ... | 4.72 | 17.58 | 50.56 | 63.42 | $\text{K}_2\text{Na}(\text{SO}_4)_2 + \text{KCl} + \text{NaCl}$ |
| 24.8 | 1.2484 | 4.37 | 20.00 | 48.36 | 64.01 | $\text{K}_2\text{Na}(\text{SO}_4)_2 + \text{KCl} + \text{NaCl}$ |
| *16.3 | ... | 16.29 | 9.16 | 61.06 | 53.93 | $\text{K}_2\text{Na}(\text{SO}_4)_2 + \text{NaCl} + \text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O} + \text{Na}_2\text{SO}_4$ |
| 24.5 | 1.2625 | 14.45 | 9.90 | 58.46 | 53.91 | $\text{K}_2\text{Na}(\text{SO}_4)_2 + \text{NaCl} + \text{Na}_2\text{SO}_4$ |
| 0.3 | ... | 2.75 | 25.77 | 17.93 | 40.95 | $\text{K}_2\text{Na}(\text{SO}_4)_2 + \text{KCl} + \text{K}_2\text{SO}_4$ |
| 25.0 | 1.2034 | 2.94 | 36.20 | 14.80 | 48.06 | $\text{K}_2\text{Na}(\text{SO}_4)_2 + \text{KCl} + \text{K}_2\text{SO}_4$ |
| *17.9 | 1.2474 | 13.84 | 0.0 | 62.57 | 48.70 | $\text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O} + \text{Na}_2\text{SO}_4 + \text{NaCl}$ |
| *30.1 | 1.2890 | 50.41 | 10.08 | 40.33 | 0.0 | $\text{K}_2\text{Na}(\text{SO}_4)_2 + \text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O} + \text{Na}_2\text{SO}_4$ |
| -21.4 | ... | ... | ... | 46.61 | 46.36 | $\text{NaCl} \cdot 2\text{H}_2\text{O} + \text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O}$ |
| -23.7 | ... | ... | 10.51 | 39.58 | 50.09 | $\text{NaCl} \cdot 2\text{H}_2\text{O} + \text{KCl}$ |
| -10.9 | ... | 1.45 | 30.68 | ... | 29.23 | $\text{KCl} + \text{K}_2\text{SO}_4$ |
| -3 | ... | 16.25 | 10.03 | 6.21 | ... | $\text{K}_2\text{Na}(\text{SO}_4)_2 + \text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O}$ |
| -3 | ... | 16.24 | 10.03 | 6.21 | ... | $\text{K}_2\text{Na}(\text{SO}_4)_2 + \text{K}_2\text{SO}_4$ |
| -14 | ... | 1.39 | 25.59 | 8.78 | 32.94 | $\text{K}_2\text{Na}(\text{SO}_4)_2 + \text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O} + \text{KCl}$ |
| -14 | ... | 1.39 | 25.59 | 8.78 | 32.94 | $\text{K}_2\text{Na}(\text{SO}_4)_2 + \text{K}_2\text{SO}_4 + \text{KCl}$ |
| -23.3 | ... | 0.41 | 15.15 | 44.20 | 58.97 | $\text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O} + \text{KCl} + \text{NaCl} \cdot 2\text{H}_2\text{O}$ |

* Indicates transition points.

SOLUBILITY OF SODIUM SULPHATE IN AQUEOUS SOLUTIONS OF
SULPHURIC ACID.

(D'Ans — Z. anorg. Ch. 49, 356, '06.)

| Mols. per 1000 Gms. Solution. | | Grams per 1000 Gms. Solution. | |
|-------------------------------|--------------------------------|-------------------------------|--------------------------------|
| 0.884 H_2SO_4 | 2.256 Na_2SO_4 | 86.7 H_2SO_4 | 298.2 Na_2SO_4 |
| 1.666 " | 2.437 " | 163.3 " | 322.1 " |
| 1.576 " | 2.363 " | 154.5 " | 312.3 " |
| 2.611 " | 2.091 " | 256.1 " | 276.4 " |

SOLUBILITY OF SODIUM SULPHATE IN AQUEOUS SOLUTIONS OF
SODIUM CHLORIDE AT DIFFERENT TEMPERATURES.

(Seidell — Am. Ch. J. 27, 52, '02.)

Results at 10°.

| Sp. Gr. of Solutions. | Gms. per 100 Gms. H_2O . | |
|-----------------------------|---|----------------------------|
| | NaCl. | Na_2SO_4 . |
| 1.080 | 0.0 | 9.14 |
| 1.083 | 4.28 | 6.42 |
| 1.102 | 9.60 | 4.76 |
| 1.150 | 15.65 | 3.99 |
| 1.164 | 21.82 | 3.97 |
| 1.192 | 28.13 | 4.15 |
| 1.207 | 30.11 | 4.34 |
| 1.217 | 32.27 | 4.59 |
| 1.223 | 33.76 | 4.75 |

Results at 21.5°.

| Sp. Gr. of Solutions. | Gms. per 100 Gms. H_2O . | |
|-----------------------------|---|----------------------------|
| | NaCl. | Na_2SO_4 . |
| 1.164 | 0.0 | 21.33 |
| 1.169 | 9.05 | 15.48 |
| 1.199 | 17.48 | 13.73 |
| 1.214 | 20.41 | 13.62 |
| 1.243 | 26.01 | 15.05 |
| 1.244 | 26.53 | 14.44 |
| 1.244 | 27.74 | 13.39 |
| 1.244 | 31.25 | 10.64 |
| 1.243 | 31.80 | 10.28 |
| 1.245 | 32.10 | 8.43 |
| 1.219 | 33.69 | 4.73 |
| 1.212 | 34.08 | 2.77 |
| 1.197 | 35.46 | 0.00 |

Results at 27°.

| Sp. Gr. of Solutions. | Gms. per 100 Gms. H_2O . | |
|-----------------------------|---|----------------------------|
| | NaCl. | Na_2SO_4 . |
| 1.228 | 0.0 | 31.10 |
| 1.230 | 2.66 | 28.73 |
| 1.230 | 5.29 | 27.17 |
| 1.235 | 7.90 | 26.02 |
| 1.259 | 16.13 | 24.83 |
| 1.253 | 18.91 | 21.39 |
| 1.249 | 19.64 | 20.11 |
| 1.245 | 20.77 | 19.29 |
| 1.238 | 32.33 | 9.53 |

Results at 30°.

| Sp. Gr. of Solutions. | Gms. per 100 Gms. H_2O . | |
|-----------------------------|---|----------------------------|
| | NaCl. | Na_2SO_4 . |
| 1.281 | 0.0 | 39.70 |
| 1.282 | 2.45 | 38.25 |
| 1.284 | 5.61 | 36.50 |
| 1.290 | 7.91 | 35.96 |
| 1.276 | 10.61 | 31.64 |
| 1.270 | 12.36 | 29.87 |
| 1.258 | 15.65 | 25.02 |
| 1.249 | 18.44 | 21.30 |
| 1.244 | 20.66 | 19.06 |
| 1.236 | 32.43 | 9.06 |

Results at 33°.

| Sp. Gr. of Solutions. | Gms. per 100 Gms. H_2O . | |
|-----------------------------|---|----------------------------|
| | NaCl. | Na_2SO_4 . |
| 1.329 | 0.0 | 48.48 |
| 1.323 | 1.22 | 46.49 |
| 1.318 | 1.99 | 45.16 |
| 1.315 | 2.64 | 44.09 |
| 1.309 | 3.47 | 42.61 |
| 1.265 | 12.14 | 29.32 |
| 1.237 | 21.87 | 16.83 |
| 1.234 | 32.84 | 8.76 |
| 1.217 | 33.99 | 4.63 |
| 1.208 | 34.77 | 2.75 |

Results at 35°.

| Sp. Gr. of Solutions. | Gms. per 100 Gms. H_2O . | |
|-----------------------------|---|----------------------------|
| | NaCl. | Na_2SO_4 . |
| 1.324 | 0.0 | 47.94 |
| 1.314 | 2.14 | 43.75 |
| 1.256 | 13.57 | 26.26 |
| 1.238 | 18.78 | 19.74 |
| 1.231 | 31.91 | 8.28 |
| 1.193 | 35.63 | 0.00 |

SOLUBILITY OF SODIUM SULPHATE IN AQUEOUS ETHYL ALCOHOL.

(de Bruyn — Z. physik. Chem. 32, 101, '00.)

| t°. | Content of Alcohol. | Gms. Na ₂ SO ₄ per 100 Gms. Aq. Alcohol. | Gms. per 100 Gms. Solution. | | | Solid Phase. |
|-----|---------------------|--|-----------------------------|-----------------------------------|-----------------------------------|---|
| | | | H ₂ O. | C ₂ H ₅ OH. | Na ₂ SO ₄ . | |
| 15 | 0.7 | 12.7 | 88.7 | 0.0 | 11.3 | Na ₂ SO ₄ .10H ₂ O |
| " | 9.2 | 6.7 | 85.1 | 8.6 | 6.3 | " |
| " | 19.4 | 2.6 | 78.6 | 18.9 | 2.9 | " |
| " | 39.7 | 0.5 | 60.0 | 39.5 | 0.5 | " |
| " | 58.9 | 0.1 | 41.1 | 58.8 | 0.1 | " |
| " | 72.0 | 0.0 | 28.0 | 72.0 | 0.0 | " |
| " | 0.0 | 37.4 | 72.8 | 0.0 | 27.2 | Na ₂ SO ₄ .7H ₂ O |
| " | 11.2 | 16.3 | 76.5 | 9.5 | 14.0 | " |
| " | 20.6 | 7.0 | 74.3 | 19.2 | 6.5 | " |
| " | 30.2 | 2.0 | 68.4 | 29.6 | 2.0 | " |
| 25 | 0.0 | 28.2 | 78.1 | 0.0 | 21.9 | Na ₂ SO ₄ .10H ₂ O |
| " | 10.6 | 13.9 | 78.5 | 9.3 | 12.2 | " |
| " | 24.0 | 4.5 | 72.8 | 22.9 | 4.3 | " |
| " | 54.0 | 0.4 | 45.6 | 54.0 | 0.4 | " |
| 36 | 0.0 | 49.3 | 67.0 | 0.0 | 33.0 | Na ₂ SO ₄ |
| " | 8.8 | 29.2 | 70.6 | 6.8 | 22.6 | " |
| " | 12.8 | 22.4 | 71.2 | 10.5 | 18.3 | " |
| " | 17.9 | 15.4 | 71.1 | 15.5 | 13.4 | " |
| " | 18.1 | 15.3 | 71.0 | 15.7 | 13.3 | " |
| " | 28.9 | 5.4 | 66.5 | 28.4 | 5.1 | " |
| " | 48.7 | 0.8 | 50.9 | 48.3 | 0.8 | " |
| 45 | 0.0 | 47.9 | 67.6 | 0.0 | 32.4 | " |
| " | 9.0 | 27.5 | 71.3 | 7.1 | 21.6 | " |
| " | 14.5 | 19.2 | 71.8 | 12.1 | 16.1 | " |
| " | 20.6 | 12.3 | 70.6 | 18.4 | 10.0 | " |
| " | 31.0 | 5.1 | 65.6 | 29.5 | 4.9 | " |

Between certain concentrations of the aqueous alcohol the liquid separates into two layers at 25°, 36° and 45°.

| t°. | Upper Layer. | | | Lower Layer. | | |
|-----|------------------------|--|--|------------------------|--|--|
| | Gms. H ₂ O. | Gms. C ₂ H ₅ OH. | Gms. Na ₂ SO ₄ . | Gms. H ₂ O. | Gms. C ₂ H ₅ OH. | Gms. Na ₂ SO ₄ . |
| 25 | 66.5 | 27.3 | 6.2 | 67.4 | 5.1 | 27.5 |
| " | 68.1 | 23.9 | 8.0 | 68.5 | 6.0 | 25.5 |
| " | 68.3 | 23.1 | 8.6 | 68.3 | 6.7 | 25.0 |
| 36 | ... | ... | ... | 66.6 | 4.1 | 29.3 |
| " | 57.7 | 38.4 | 3.9 | ... | ... | ... |
| " | 65.0 | 28.3 | 6.7 | 68.8 | 5.9 | 25.3 |
| " | 68.1 | 21.2 | 10.7 | 68.9 | 9.4 | 21.7 |
| 45 | 61.8 | 32.9 | 5.3 | ... | ... | ... |
| " | 65.8 | 25.3 | 8.9 | 68.4 | 8.8 | 22.8 |
| " | 66.0 | 24.0 | 10.0 | 68.6 | 10.1 | 21.3 |

SOLUBILITY OF SODIUM SULPHATE IN AQUEOUS PROPYL ALCOHOL
AT 20°.

(Linebarger — Am. Ch. J. 14, 380, '92.)

| Gms. C_3H_7OH per 100 Gms. Alcohol-Water Mixture. | Gms. Na_2SO_4 per 100 Gms. Sat. Solution. | Gms. C_3H_7OH per 100 Gms. Alcohol-Water Mixture. | Gms. Na_2SO_4 per 100 Gms. Sat. Solution. |
|--|--|--|--|
| 42.20 | 1.99 | 56.57 | 0.55 |
| 49.77 | 1.15 | 60.64 | 0.44 |
| 55.65 | 0.72 | 62.81 | 0.38 |

100 gms. H_2O dissolve 183.7 gms. sugar + 30.5 gms. Na_2SO_4 at 31.25°, or 100 gms. sat. solution contain 52.2 gms. sugar + 9.6 gms. Na_2SO_4 .
(Köhler — Z. Ver. Zuckerind. 47, 447, '97.)

SODIUM (Bi) SULPHATE $NaHSO_4$.

100 gms. H_2O dissolve 28.6 gms. at 25°, and 50.0 gms. at 100°.

100 gms. alcohol dissolve 1.4 gms. at 25°.

(U. S. P.)

SODIUM THIO SULPHATE $Na_2S_2O_3$.

SOLUBILITY IN WATER.

(Young and Burke — J. Am. Chem. Soc. 26, 1417, '04.)

| t°. | Gms. $Na_2S_2O_3$ per 100 Gms. | | Solid Phase. | t°. | Gms. $Na_2S_2O_3$ per 100 Gms. | | Solid Phase. |
|------|-----------------------------------|--------|---------------------|------|-----------------------------------|--------|------------------|
| | Solution. | Water. | | | Solution. | Water. | |
| 10 | 37.38 | 59.69 | Pentahydrate (com.) | 20 | 62.11 | 163.92 | Monohydrate |
| 20 | 41.20 | 70.07 | " | 25 | 62.73 | 168.32 | " |
| 25 | 43.15 | 75.90 | " | 30 | 63.53 | 174.20 | " |
| 30 | 45.19 | 82.45 | " | 20 | 55.15 | 122.68 | Dihydrate |
| 35 | 47.71 | 91.24 | " | 25 | 56.03 | 127.43 | " |
| 40 | 50.83 | 103.37 | " | 30 | 57.13 | 133.27 | " |
| 45 | 55.33 | 123.87 | " | 35 | 58.13 | 138.84 | " |
| 20 | 49.38 | 97.55 | Pentahydrate (8) | 40 | 59.17 | 144.92 | " |
| 25 | 52.15 | 108.98 | " | 50 | 62.28 | 165.11 | " |
| 28 | 54.48 | 119.69 | " | 33.5 | 58.59 | 141.48 | Tetrahydrate (?) |
| 29.5 | 55.85 | 126.50 | " | 36.2 | 60.51 | 153.23 | " |
| 30 | 56.57 | 130.26 | " | 36.6 | 62.80 | 168.82 | " |

100 gms. alcohol dissolve 0.0025 gm. $Na_2S_2O_3$ and 0.0034 gm. $Na_2S_2O_3 \cdot 5H_2O$ at room temperature.
(Böttker — Z. physik. Chem. 22, 510, '97.)

100 gms. alcohol of 0.941 Sp. Gr. dissolve 33.3 gms. at 15.5°.

(See also Parmentier — Compt. rend. 122, 136, '96.)

SODIUM SULPHITE Na_2SO_3 .

100 gms. H_2O dissolve 14.1 gms. at 0°, 25.8–28.7 gms. at 20°, and 49.5 gms. at 40°.

(Kremers — Pogg. Ann. 99, 50, '56.)

SODIUM TELLURIATE $Na_2TeO_4 \cdot 2H_2O$.

100 gms. H_2O dissolve 0.77 gm. Na_2TeO_4 at 18°, and 2.0 gms. at 100°. Solid phase $Na_2TeO_4 \cdot 2H_2O$.

100 gms. H_2O dissolve 1.43 gms. Na_2TeO_4 at 18°, and 2.5 gms. at 50°. Solid phase $Na_2TeO_4 \cdot 4H_2O$.

(Mylius — Ber. 34, 2208, '01.)

SODIUM TUNGSTATE

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SODIUM TUNGSTATE (Wolframate) $\text{Na}_2\text{WO}_4 \cdot 2\text{H}_2\text{O}$.

SOLUBILITY IN WATER.

(Funk — Ber. 33, 3701, '00.)

| t°. | Gms. Na_2WO_4 per 100 Gms. Solution. | Mols. Na_2WO_4 per 100 Mols. H_2O | Solid Phase. | t°. | Gms. Na_2WO_4 per 100 Gms. Solution. | Mols. Na_2WO_4 per 100 Mols. H_2O | Solid Phase. |
|------|--|---|---|------|--|---|--|
| -5 | 30.60 | 2.70 | $\text{Na}_2\text{WO}_4 \cdot 10\text{H}_2\text{O}$ | -3.5 | 41.67 | 4.37 | $\text{Na}_2\text{WO}_4 \cdot 2\text{H}_2\text{O}$ |
| -4 | 31.87 | 2.86 | " | +5 | 41.73 | 4.39 | " |
| -3.5 | 32.98 | 3.01 | " | 18 | 42.0 | 4.40 | " |
| -2 | 34.52 | 3.23 | " | 21 | 42.27 | 4.48 | " |
| 0 | 36.54 | 3.52 | " | 43.5 | 43.98 | 4.81 | " |
| +3 | 39.20 | 3.95 | " | 80.5 | 47.65 | 5.57 | " |
| 5 | 41.02 | 4.26 | " | 100 | 49.31 | 5.95 | " |

Sp. Gr. of sat. solution at 18° = 1.573. For Sp. Gr. determinations of aqueous solutions at 20°, see Pawlewski — Ber. 33, 1223, '00.

SODIUM FLUO ZIRCONATE $5\text{NaF} \cdot \text{ZrF}_4$.

100 gms. H_2O dissolve 0.387 gm. at 18°, and 1.67 gms. at 100°.

(Marignac — J. pr. Chem. 83, 202, '61.)

STRONTIUM BENZOATE $\text{Sr}(\text{C}_6\text{H}_5\text{O}_2)_2 \cdot \text{H}_2\text{O}$.

SOLUBILITY IN WATER.

(Paietta — Gazz. chim. ital. 36, II, 67, '06.)

| t°. | Gms. Sr $(\text{C}_6\text{H}_5\text{O}_2)_2$ per 100 gms. solution | 15.7° | 24.7° | 31.4° | 40.9° |
|-----|--|-------|-------|-------|-------|
| | | 5.31 | 5.4 | 5.56 | 5.77 |

STRONTIUM BROMATE $\text{Sr}(\text{BrO}_3)_2$.

One liter of aqueous solution contains 0.9 gram molecules or 309 gms. $\text{Sr}(\text{BrO}_3)_2$, at 18°.

(Kohlrausch — Sitzb. K. Akad. Wiss. (Berlin) 90, '97.)

STRONTIUM BROMIDE $\text{SrBr}_2 \cdot 6\text{H}_2\text{O}$.

SOLUBILITY IN WATER.

(Average curve from results of Kremers — Pogg. Ann. 103, 65, '58; and Etard — Ann. chim. phys. [7] 2, 540, '94.)

| t°. | Gms. SrBr_2 per 100 Gms. Solution. | Water. | t°. | Gms. SrBr_2 per 100 Gms. Solution. | Water. |
|-----|---|--------|-----|---|--------|
| 0 | 46.0 | 85.2 | 40 | 55.2 | 123.2 |
| 10 | 48.3 | 93.0 | 50 | 57.6 | 135.8 |
| 20 | 50.6 | 102.4 | 60 | 60.0 | 150.0 |
| 25 | 51.7 | 107.0 | 80 | 64.5 | 181.8 |
| 30 | 52.8 | 111.9 | 100 | 69.0 | 222.5 |

Sp. Gr. of sat. solution at 20° approximately 1.70.

100 gms. abs. alcohol dissolve 64.5 gms. SrBr_2 at 0°. Sp. Gr. of solution = 1.21.

(Fonnes; Diacon — J. pharm. chim. [6] 2, 59, '95.)

STRONTIUM CARBONATE SrCO_3 .

One liter of water dissolves 0.0082 gm. at 8.8° and 0.0109 gm. at 24° by conductivity method.

(Holleman — Z. physik. Chem. 12, 130, '93; Kohlrausch and Rose — *Ibid.* 12, 241, '93.)

One liter of water saturated with CO_2 dissolves 1.19 gms. $\text{Sr}(\text{HCO}_3)_2$.

STRONTIUM CHLORATE $\text{Sr}(\text{ClO}_3)_2$.

100 gms. H_2O dissolve 174.9 gms. $\text{Sr}(\text{ClO}_3)_2$, or 100 gms. sat. solution contain 63.6 gms. at 18° . Sp. Gr. of solution is 1.839.

(Mylius and Funk — Ber. 30, 1718, '97.)

STRONTIUM CHLORIDE $\text{SrCl}_2 \cdot 6\text{H}_2\text{O}$.

SOLUBILITY IN WATER.

(Average curve from the results of Mulder; Etard; see also Tilden — J. Chem. Soc. 45, 409, '84.)

| t° . | Gms. SrCl_2 per 100 Gms. | | Solid Phase. | t° . | Gms. SrCl_2 per 100 Gms. | | Solid Phase. |
|-------------|-----------------------------------|--------|---|-------------|-----------------------------------|--------|---|
| | Solution. | Water. | | | Solution. | Water. | |
| -20 | 26.0 | 35.1 | $\text{SrCl}_2 \cdot 6\text{H}_2\text{O}$ | 60 | 45.0 | 81.8 | $\text{SrCl}_2 \cdot 6\text{H}_2\text{O}$ |
| 0 | 30.3 | 43.5 | " | 70 | 46.2 | 85.9 | $\text{SrCl}_2 \cdot 6\text{H}_2\text{O}$ |
| 10 | 32.3 | 47.7 | " | 80 | 47.5 | 90.5 | " |
| 20 | 34.6 | 52.9 | " | 100 | 50.2 | 100.8 | " |
| 25 | 35.8 | 55.8 | " | 120 | 53.0 | 112.8 | " |
| 30 | 37.0 | 58.7 | " | 140 | 55.6 | 125.2 | " |
| 40 | 39.5 | 65.3 | " | 160 | 58.5 | 141.0 | " |
| 50 | 42.0 | 72.4 | " | 180 | 62.0 | 163.1 | " |

Transition temperature about 62.5° . Sp. Gr. of sat. solution at 0° = 1.334; at 15° = 1.36.

SOLUBILITY OF STRONTIUM CHLORIDE IN AQUEOUS SOLUTIONS OF HYDROCHLORIC ACID AT 0° .

(Engel — Ann. chim. phys. [6] 13, 376, '88.)

| Mg. Mols. per 10 cc. Solution. | | Sp. Gr. of Solution. | Grams per 100 cc. Solution. | |
|--------------------------------|-------|----------------------|-----------------------------|-------|
| $\frac{1}{2}\text{SrCl}_2$. | HCl. | | SrCl_2 . | HCl. |
| 51.6 | 0 | 1.334 | 40.9 | 0.0 |
| 44.8 | 6.1 | 1.304 | 35.5 | 2.22 |
| 37.85 | 12.75 | 1.269 | 30.0 | 4.65 |
| 27.2 | 23.3 | 1.220 | 21.56 | 8.49 |
| 22.0 | 28.38 | 1.201 | 17.44 | 10.35 |
| 14.0 | 37.25 | 1.167 | 11.09 | 13.58 |
| 4.25 | 52.75 | 1.133 | 3.37 | 19.23 |

100 gms. abs. methyl alcohol dissolve 63.3 gms. $\text{SrCl}_2 \cdot 6\text{H}_2\text{O}$ at 6° .

100 gms. abs. ethyl alcohol dissolve 3.8 gms. $\text{SrCl}_2 \cdot 6\text{H}_2\text{O}$ at 6° .

(de Bruyn — Z. physik. Chem. 10, 787, '92.)

SOLUBILITY OF STRONTIUM CHLORIDE IN AQUEOUS ETHYL ALCOHOL SOLUTIONS AT 18° .

(Gerardin — Ann. chim. phys. [4] 5, 156, '65.)

| Sp. Gr. of Aq. Alcohol at 0° . | Wt. per cent Alcohol. | Gms. SrCl_2 per 100 Gms. Alcohol. | Sp. Gr. of Aq. Alcohol at 0° . | Wt. per cent Alcohol. | Gms. SrCl_2 per 100 Gms. Alcohol. |
|---------------------------------------|-----------------------|--|---------------------------------------|-----------------------|--|
| 0.990 | 6 | 49.81 | 0.939 | 45 | 26.8 |
| 0.985 | 10 | 47.0 | 0.909 | 59 | 19.2 |
| 0.973 | 23 | 39.6 | 0.846 | 86 | 4.9 |
| 0.966 | 30 | 35.9 | 0.832 | 91 | 3.2 |
| 0.953 | 38 | 30.4 | | | |

STRONTIUM CHROMATE 318**STRONTIUM CHROMATE** SrCrO_4 .

SOLUBILITY IN WATER, ETC., AT 15° .
(Fresenius — Z. anal. Chem. 29, 419, '90; 30, 672, '91.)

| Solvent. | Gms. SrCrO_4 per 100 Gms. Solvent. | Solvent. | Gms. SrCrO_4 per 100 Gms. Solvent. |
|-----------------------------------|---|-------------------------|---|
| Water | 0.12 | Aq. Ethyl Alcohol (29%) | 0.0132 |
| Aq. NH_4Cl (5%) | 0.195 | Aq. Ethyl Alcohol (53%) | 0.002 |
| Aq. CH_3COOH (1%) | 1.57 | | |

STRONTIUM FLUORIDE SrF_2 .

One liter of water dissolves 1.87 mg. equiv. or 0.117 gm. SrF_2 at 18° , by conductivity method.
(Kohlrausch — Z. physik. Chem. 50, 356, '04-'05.)

STRONTIUM HYDROXIDE $\text{Sr}(\text{OH})_2$.

SOLUBILITY IN WATER.

(Scheibler — N. Z. Rubenzuckerind. 7, 257; abstract in J. pharm. chim. [5] 8, 540, '83.)

| t° . | Grams per 100 Grams Solution. | | Grams per 100 cc. Solution. | |
|-------------|-------------------------------|--|-----------------------------|--|
| | SrO . | $\text{Sr}(\text{OH})_2 \cdot 8\text{H}_2\text{O}$. | SrO . | $\text{Sr}(\text{OH})_2 \cdot 8\text{H}_2\text{O}$. |
| 0 | 0.35 | 0.90 | 0.35 | 0.90 |
| 10 | 0.48 | 1.23 | 0.48 | 1.23 |
| 20 | 0.68 | 1.74 | 0.68 | 1.74 |
| 30 | 1.00 | 2.57 | 1.01 | 2.59 |
| 40 | 1.48 | 3.80 | 1.51 | 3.87 |
| 50 | 2.13 | 5.46 | 2.18 | 5.59 |
| 60 | 3.03 | 7.77 | 3.12 | 8.00 |
| 70 | 4.35 | 11.16 | 4.55 | 11.67 |
| 80 | 6.56 | 16.83 | 7.02 | 18.01 |
| 90 | 12.0 | 30.78 | 13.64 | 34.99 |
| 100 | 18.6 | 47.71 | 22.85 | 58.61 |

STRONTIUM IODATE $\text{Sr}(\text{IO}_3)_2$.

100 gms. H_2O dissolve 0.026 gm. at 15° , and 0.72–0.91 gm. at 100° .
(Gay-Lussac; Rammelsberg — Pogg. Ann. 44, 575, '38.)

STRONTIUM IODIDE $\text{SrI}_2 \cdot 6\text{H}_2\text{O}$.

SOLUBILITY IN WATER.

(Average curve from the results of Kremers — Pogg. Ann. 103, 65, '58; and Etard — Ann. chim. phys. [7] 2, 528, '74.)

| t° . | Gms. SrI_2 per 100 Gms. | | Solid Phase. | t° . | Gms. SrI_2 per 100 Gms. | | Solid Phase. |
|-------------|----------------------------------|--------|--|-------------|----------------------------------|--------|--|
| | Solution. | Water. | | | Solution. | Water. | |
| 0 | 62.3 | 165.3 | $\text{SrI}_2 \cdot 6\text{H}_2\text{O}$ | 90 | 78.5 | 365.2 | $\text{SrI}_2 \cdot 2\text{H}_2\text{O}$ |
| 20 | 64.0 | 177.8 | " | 100 | 79.3 | 383.1 | " |
| 40 | 65.7 | 191.5 | " | 120 | 80.7 | 418.1 | " |
| 60 | 68.5 | 217.5 | " | 140 | 82.5 | 471.5 | " |
| 80 | 73.0 | 270.4 | " | 175 | 85.6 | 594.4 | " |

Transition temperature about 90° . Sp. Gr. of sat. solution at 20° = 2.15.

100 gms. saturated solution of strontium iodide in absolute alcohol contain 2.6 gms. SrI_2 at -20° , 3.1 gms. at $+4^\circ$, 4.3 gms. at 39° , and 4.7 gms. at 82° .
(Etard.)

STRONTIUM MALATE $\text{SrC}_4\text{H}_4\text{O}_6$.

SOLUBILITY IN WATER.

(Cantoni and Basadonna — Bull. soc. chim. 35, 731, '06.)

| t°. | Gms. per 100 cc. Solution. | t°. | Gms. per 100 cc. Solution. | t°. | Gms. per 100 cc. Solution. |
|-----|----------------------------|-----|----------------------------|-----|----------------------------|
| 20 | 0.448 | 40 | 1.385 | 55 | 2.460 |
| 25 | 0.550 | 45 | 1.743 | 60 | 2.821 |
| 30 | 0.752 | 50 | 2.098 | 65 | 3.148 |
| 35 | 1.036 | | | 70 | 3.360 |

STRONTIUM MOLYBDATE SrMoO_4 .100 gms. H_2O dissolve 0.0104 gm. SrMoO_4 at 17°.

(Smith and Bradbury — Ber. 24, 2930, '91.)

STRONTIUM NITRATE $\text{Sr}(\text{NO}_3)_2$.

SOLUBILITY IN WATER.

(Mulder; see also Etard for slightly lower results.)

| t°. | Gms. $\text{Sr}(\text{NO}_3)_2$ per 100 Gms. | | Solid Phase. | t°. | Gms. $\text{Sr}(\text{NO}_3)_2$ per 100 Gms. | | Solid Phase. |
|-----|--|--------|--|-----|--|--------|----------------------------|
| | Solution. | Water. | | | Solution. | Water. | |
| 0 | 28.3 | 39.5 | $\text{Sr}(\text{NO}_3)_2 \cdot 4\text{H}_2\text{O}$ | 40 | 47.7 | 91.3 | $\text{Sr}(\text{NO}_3)_2$ |
| 10 | 35.5 | 54.9 | " | 50 | 48.1 | 92.6 | " |
| 20 | 41.5 | 70.8 | " | 60 | 48.5 | 94.0 | " |
| 25 | 44.1 | 79.0 | " | 80 | 49.3 | 97.2 | " |
| 30 | 46.7 | 87.6 | " | 100 | 50.3 | 101.1 | " |

Transition temperature about 31°. Sp. Gr. of sat. solution at 20° = 1.44.

100 gms. absolute alcohol dissolve 0.024 gm. $\text{Sr}(\text{NO}_3)_2$.100 gms. rectified spirit dissolve 0.50 gm. $\text{Sr}(\text{NO}_3)_2$.

(Hill — Pharm. J. Trans. [3] 19, 420, '88.)

STRONTIUM OXALATE $\text{SrC}_2\text{O}_4 \cdot \text{H}_2\text{O}$.One liter of aqueous solution contains 0.52 mg. equivalent SrC_2O_4 or 0.046 gm. at 18°, conductivity method.

(Kohlrausch — Z. physik. Chem. 50, 356, '04-'05.)

SOLUBILITY OF STRONTIUM OXALATE IN AQUEOUS ACETIC ACID SOLUTIONS AT 26°-27°.

(Herz and Muhs — Ber. 36, 3715, '03.)

| Normality of Acetic Acid. | Gms. per 100 cc. Solution. | | Normality of Acetic Acid. | Gms. per 100 cc. Solution. | |
|---------------------------|----------------------------|---|---------------------------|----------------------------|---|
| | CH_3COOH . | Residue $\text{SrC}_2\text{O}_4 \cdot \text{H}_2\text{O}$. | | CH_3COOH . | Residue $\text{SrC}_2\text{O}_4 \cdot \text{H}_2\text{O}$. |
| 0.0 | 0.0 | 0.009 | 3.86 | 23.16 | 0.0898 |
| 0.58 | 3.48 | 0.0526 | 5.79 | 34.74 | 0.0496 |
| 1.45 | 8.70 | 0.0622 | 16.26 | 97.56 | 0.0060 |
| 2.89 | 17.34 | 0.0642 | | | |

STRONTIUM SALICYLATE $\text{Sr}(\text{C}_6\text{H}_4\text{OH.COO})_2 \cdot 2\text{H}_2\text{O}$.100 gms. H_2O dissolve 5.55 gms. at 25°, and 28.6 gms. at b. pt.

(U. S. P.)

100 cc. aqueous solution contain 1.830 gms. salt.

(Barthe.)

100 gms. alcohol dissolve 1.5 gms. at 25°, and 9.52 gms. at b. pt.

(U. S. P.; Barthe — Bull. soc. chim. [3] 11, 519, '94.)

STRONTIUM SULPHATE

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STRONTIUM SULPHATE SrSO_4 .

One liter of aqueous solution contains 1.24 mg. equivalents or 0.114 gm. SrSO_4 at 18°, by conductivity method.

(Kohlrausch — Z. physik. Chem. 50, 356, '04-'05; Holleman — *Ibid.* 12, 129, '93; Wolfmann — Öster. Ung. Z. Zuckerind. 25, 997, '97.)

SOLUBILITY OF STRONTIUM SULPHATE IN AQUEOUS SOLUTIONS OF HYDROCHLORIC, NITRIC, CHLORACETIC AND FORMIC ACIDS.

(Banthisch — J. pr. Chem. [2] 29, 52, '84.)

| cc. of Aq. Acid containing 1 Mg. Equiv. in each case. | In Aq. HCl | | In Aq. HNO_3 | | In Aq. CH_3ClCOOH | | In Aq. HCOOH | |
|---|-----------------------|-------------------|-----------------------|-------------------|-----------------------------------|-------------------|-----------------------|-------------------|
| | Gms. per 100 cc. Sol. | | Gms. per 100 cc. Sol. | | Gms. per 100 cc. Sol. | | Gms. per 100 cc. Sol. | |
| | HCl. | SrSO_4 . | HNO_3 . | SrSO_4 . | CH_3ClCOOH . | SrSO_4 . | HCOOH . | SrSO_4 . |
| 0.2 | 18.23 | 0.161 | 31.52 | 0.381 | ... | ... | ... | ... |
| 0.5 | 7.29 | 0.207 | 12.61 | 0.307 | ... | ... | ... | ... |
| 1.0 | 3.65 | 0.188 | 6.30 | 0.217 | 94.47 | 0.026 | 46.02 | 0.024 |
| 2.0 | 1.82 | 0.126 | 3.15 | 0.138 | 47.23 | 0.022 | ... | ... |
| 10.0 | 0.36 | 0.048 | 0.63 | 0.049 | ... | ... | ... | ... |

SOLUBILITY OF STRONTIUM SULPHATE IN SULPHURIC ACID SOLUTIONS.

| t°. | Conc. of H_2SO_4 . | Gms. SrSO_4 per 100 Gms. Acid. | Authority. |
|------|------------------------------------|---|---|
| ord. | concentrated | 5.68 | (Struve — Z. anal. Chem. 9, 34, 1870.) |
| " | fuming | 9.77 | " " |
| " | 91% | 0.08 | (Varenne and Paulean — Compt. rend. 93, 1016, '81.) |
| 70 | Sp. Gr. 1.843 = 99% | 14.0 | (Garside — Chem. News, 31, 245, '75.) |

SOLUBILITY OF STRONTIUM SULPHATE IN AQUEOUS SALT SOLUTIONS.

(Virck — Chem. Centralb. 402, '62.)

| In Aq. NaCl. | | In Aq. KCl. | | In Aq. MgCl_2 . | | In Aq. CaCl_2 . | |
|--------------|-------|-------------|-------|--------------------------|-------|--------------------------|-------|
| (a.) | (b.) | (a.) | (b.) | (a.) | (b.) | (a.) | (b.) |
| 8.44 | 0.165 | 8.22 | 0.193 | 1.59 | 0.199 | 8.67 | 0.176 |
| 15.54 | 0.219 | 12.54 | 0.193 | 4.03 | 0.206 | 16.51 | 0.185 |
| 22.17 | 0.181 | 18.08 | 0.251 | 13.63 | 0.242 | 33.70 | 0.171 |

(a) = Gms. salt per 100 gms. aq. solution. (b) = Gms. SrSO_4 per 100 gms. solvent.

STRONTIUM TARTRATE $\text{SrC}_4\text{H}_4\text{O}_6 \cdot 3\text{H}_2\text{O}$.

SOLUBILITY IN WATER.

(Cantoni and Zachoder — Bull. soc. chim. [3] 33, 751, '05.)

| t°. | Gms. $\text{SrC}_4\text{H}_4\text{O}_6 \cdot 3\text{H}_2\text{O}$ per 100 cc. Solution. | t°. | Gms. $\text{SrC}_4\text{H}_4\text{O}_6 \cdot 3\text{H}_2\text{O}$ per 100 cc. Solution. | t°. | Gms. $\text{SrC}_4\text{H}_4\text{O}_6 \cdot 3\text{H}_2\text{O}$ per 100 cc. Solution. |
|-----|---|-----|---|-----|---|
| 0 | 0.112 | 25 | 0.224 | 60 | 0.480 |
| 10 | 0.149 | 30 | 0.252 | 70 | 0.580 |
| 15 | 0.174 | 40 | 0.328 | 80 | 0.680 |
| 20 | 0.200 | 50 | 0.407 | 85 | 0.755 |

SOLUBILITY OF STRONTIUM TARTRATE IN AQUEOUS SOLUTIONS OF ACETIC ACID AT 26°-27°.

(Herz and Muhs — Ber. 36, 3715, '03.)

| Normality of Acetic Acid. | Gms. per 100 cc. Solution. | | Normality of Acetic Acid. | Gms. per 100 cc. Solution. | |
|---------------------------|----------------------------|--|---------------------------|----------------------------|--|
| | CH ₃ COOH. | SrC ₄ H ₄ O ₆ .3H ₂ O. | | CH ₃ COOH. | SrC ₄ H ₄ O ₆ .3H ₂ O. |
| 0.0 | 0.0 | 0.227 | 3.77 | 21.85 | 1.051 |
| 0.565 | 3.39 | 0.678 | 5.65 | 33.90 | 0.982 |
| 1.425 | 8.15 | 0.864 | 16.89 | 101.34 | 0.184 |
| 2.85 | 17.10 | 0.996 | | | |

STRONTIUM (Di) TUNGSTATE SrW₂O₇.3H₂O.

100 cc. H₂O dissolve 0.35 gm. at 15°.

(Lefort — Ann. chim. phys. [5] 15, 326, '78.)

STRYCHNINE C₂₁H₂₂N₂O₂.

SOLUBILITY IN SEVERAL SOLVENTS.

(U. S. P.; at 20°, Müller — Apoth.-Ztg. 18 258, '03; Schindelmeyer.)

| Solvent. | Gms. C ₂₁ H ₂₂ N ₂ O ₂ per 100 Gms. | | Solvent. | Gms. C ₂₁ H ₂₂ N ₂ O ₂ per 100 Gms. | |
|----------------------------------|---|-----------------|-----------------------|---|------------------|
| | Solution at 20°. | Solvent at 25°. | | Solution at 20°. | Solvent at 25°. |
| Water | 0.021 | 0.016 | Petroleum Ether | 0.0093 | ... |
| Water Sat. with Ether | 0.0166 | ... | Acetic Ether | 0.1972 | ... |
| Ether | 0.0432 | 0.0182 | Carbon Tetra Chloride | 0.158 | 0.645 (17°) (S.) |
| Ether Sat. with H ₂ O | 0.0513 | ... | Alcohol | ... | 0.909 |
| Benzene | 0.770 | 0.666 | Amyl Alcohol | ... | 0.555 |
| Chloroform | 100+ | 16.6 | Glycerine | ... | 0.25 (15°) |

100 gms. pyridine dissolve 1.24 gm. C₂₁H₂₂N₂O₂ at 26°.

(Holtz — J. Physic. Chem. 9, 764, '05.)

SOLUBILITY OF STRYCHNINE NITRATE AND SULPHATE IN SEVERAL SOLVENTS.

(U. S. P.)

| Solvent. | Strychnine Nitrate. | | Strychnine Sulphate. | |
|------------|-------------------------------|------------|-------------------------------|-----------|
| | Gms. per 100 Gms. Solvent at: | | Gms. per 100 Gms. Solvent at: | |
| | 25°. | 80°. | 25°. | 80°. |
| Water | 2.38 | 12.5 | 3.23 | 16.6 |
| Alcohol | 0.83 | 1.66 (60°) | 1.54 | 5.0 (60°) |
| Chloroform | 0.64 | ... | 0.31 | ... |
| Glycerine | 1.66 | 4.0 (15°) | 22.5 (15°) | ... |

SUBERIC ACID C₆H₁₂(COOH)₂.

SOLUBILITY IN WATER.

(Lamoureux — Compt. rend. 128, 998, '99.)

| | 6°. | 0°. | 15°. | 20°. | 35°. | 50°. | 65°. |
|--|-----|------|------|------|------|------|------|
| Gms. C ₆ H ₁₂ (COOH) ₂ per 100 cc. solution | | 0.08 | 0.13 | 0.16 | 0.45 | 0.98 | 2.22 |

SUCCINIC ACID $(\text{CH}_2)_2(\text{COOH})_2$.

SOLUBILITY IN WATER.

(Miczynski — Monatsh. Chem. 7, 263, '86; Van der Stadt — Z. physik. Chem. 41, 355, '02; Lamouroux — Compt. rend. 128, 998, '99; for other concordant results, see Bourgoin — Bull. soc. chim. [2] 21, 110 '74; Henry — Compt. rend. 99, 1157, '84.)

| t°. | Gms. $(\text{CH}_2)_2(\text{COOH})_2$ per 100 | | Gms. Succinic Anhydride $(\text{CH}_2)_2\text{COCO}$ per 100 Gms. H_2O . | Mol. per cent. | |
|-----------|---|---------------|--|------------------------|--------------------------------|
| | Gms. H_2O . | cc. Solution. | | H_2O . | $(\text{CH}_2)_2\text{COCO}$. |
| 0 | 2.80 | 2.78 (L.) | 2.34 | 99.58 | 0.42 |
| 10 | 4.51 | 4.0 | 3.80 | 99.32 | 0.68 |
| 20 | 6.89 | 5.8 | 5.77 | 98.97 | 1.03 |
| 25 | 8.06 | 7.0 | 6.74 | 98.80 | 1.20 |
| 30 | 10.58 | 8.5 | 8.79 | 98.44 | 1.56 |
| 40 | 16.21 | 12.5 | 13.42 | 97.64 | 2.36 |
| 50 | 24.42 | 18.0 | 19.95 | 96.53 | 3.47 |
| 60 | 35.83 | 24.5 | 28.77 | 95.07 | 4.93 |
| 70 | 51.07 | ... | 40.11 | 93.26 | 6.74 |
| 80 | 70.79 | ... | 54.08 | 91.12 | 8.88 |
| 89.4 | 95.45 | ... | 70.62 | 88.71 | 11.29 |
| 104.8 | 146.3 | ... | 101.2 | 84.57 | 15.43 |
| 115.1 | 188.5 | ... | 126.8 | 81.4 | 18.6 |
| 134.2 | 335.4 | ... | 187.8 | 74.72 | 25.28 |
| 159.5 | 748.2 | ... | 295.2 | 65.27 | 34.73 |
| 180.6 | 1839.0 | ... | 408.5 | 57.6 | 42.4 |
| 182.8 | ∞ | ... | 542.3 | 50.0 | 50.0 |
| 174.4 | ... | ... | 808.5 | 40.7 | 59.3 |
| 153.3 | ... | ... | 2239.0 | 19.86 | 80.14 |
| 128.0 | ... | ... | 8865.0 | 5.89 | 94.11 |
| 118.8-119 | ... | ... | ∞ | 0.00 | 100.00 |

SOLUBILITY OF SUCCINIC ACID IN ALCOHOLS AND IN ETHER.

(Timofeiev — Compt. rend. 112, 1137, '91; at 15°, Bourgoin — Ann. chim. phys. [5] 13, 405, '78.)

| Solvent. | Gms. $(\text{CH}_2)_2(\text{COOH})_2$ per 100 Gms. | | |
|---------------------|--|-------|---------|
| | Solvent at: | | |
| | -1°. | +15°. | +21.5°. |
| Abs. Methyl Alcohol | 10.51 | ... | 19.40 |
| Abs. Ethyl " " | 5.06 | 12.59 | 9.49 |
| 90% " " | ... | 7.51 | ... |
| Abs. Propyl " " | 2.11 | ... | 4.79 |
| Abs. Ether | ... | 1.265 | ... |

DISTRIBUTION OF SUCCINIC ACID BETWEEN WATER AND AMYL ALCOHOL AT 20°.

(Herz and Fischer — Ber. 37, 4748, '04.)

| Millimols $\frac{1}{2}\text{C}_4\text{H}_6\text{O}_4$ per 10 cc. | | Gms. $\text{C}_4\text{H}_6\text{O}_4$ per 100 cc. | | Millimols $\frac{1}{2}\text{C}_4\text{H}_6\text{O}_4$ per 10 cc. | | Gms. $\text{C}_4\text{H}_6\text{O}_4$ per 100 cc. | |
|--|------------|---|------------|--|------------|---|------------|
| Alcohol Layer. | Aq. Layer. | Alcohol Layer. | Aq. Layer. | Alcohol Layer. | Aq. Layer. | Alcohol Layer. | Aq. Layer. |
| 0.1888 | 0.2684 | 0.1114 | 0.1584 | 3.899 | 6.0795 | 2.302 | 3.588 |
| 0.3643 | 0.5252 | 0.215 | 0.310 | 5.199 | 8.099 | 3.069 | 4.779 |
| 0.7077 | 1.0373 | 0.418 | 0.612 | 6.334 | 10.170 | 3.739 | 6.000 |
| 1.440 | 2.1266 | 0.850 | 1.255 | 7.119 | 11.555 | 4.202 | 6.821 |
| 2.715 | 4.0495 | 1.603 | 2.391 | | | | |

SOLUBILITY OF SUCCHINIC ACID IN AQUEOUS ACETONE AT 20°.
(Herz and Knoch — Z. anorg. Chem. 41, 320, '04.)

| cc. Acetone per 100 cc. Solution. | C ₄ H ₆ O ₄ per 100 cc. Solution. | | cc. Acetone per 100 cc. Solution. | C ₄ H ₆ O ₄ per 100 cc. Solution. | |
|--------------------------------------|--|--------|--------------------------------------|--|--------|
| | Millimols. | Grams. | | Millimols. | Grams. |
| 0 | 107.8 | 6.363 | 60 | 275.7 | 16.27 |
| 10 | 127.4 | 7.519 | 70 | 278.5 | 16.44 |
| 20 | 155.8 | 9.194 | 80 | 265.3 | 15.66 |
| 30 | 186.7 | 11.02 | 90 | 201.9 | 11.91 |
| 40 | 225.4 | 13.30 | 100 | 51.5 | 3.04 |
| 50 | 254.3 | 15.01 | | | |

SOLUBILITY OF SUCCHINIC ACID IN AQUEOUS GLYCERINE
SOLUTIONS AT 25°.

(Herz and Knoch — Z. anorg. Chem. 45, 268, '05.)

| Wt. % Glycerine in Solvent. | C ₄ H ₆ O ₄ per 100 cc. Solution. | | Sp. Gr. of Solutions. | Wt. % Glycerine in Solvent. | C ₄ H ₆ O ₄ per 100 cc. Solution. | | Sp. Gr. of Solutions. |
|-----------------------------------|---|--------|-----------------------------|-----------------------------------|---|--------|-----------------------------|
| | Millimols. | Grams. | | | Millimols. | Grams. | |
| 0 | 133.4 | 7.874 | 1.0213 | 40.95 | 105.8 | 6.244 | 1.1120 |
| 7.15 | 128.2 | 7.566 | 1.0407 | 48.70 | 99.9 | 5.896 | 1.1298 |
| 20.44 | 118.3 | 6.982 | 1.0644 | 69.20 | 88.5 | 5.223 | 1.1804 |
| 31.55 | 109.7 | 6.476 | 1.0897 | 100.00* | 74.6 | 4.440 | 1.2530 |

* Sp. Gr. of Glycerine = 1.2555. Impurity about 1.5 per cent.

SUCCHINIMID C₂H₄< $\begin{smallmatrix} \text{CO} \\ \text{CO} \end{smallmatrix}$ >NH.

SOLUBILITY IN WATER AND IN ETHYL ALCOHOL.

Interpolated from original results.

(Speyers — Am. J. Sci. [4] 14, 294, '02.)

| In Water. | | | | In Ethyl Alcohol. | | | |
|-----------|---------------------------|--|--|---------------------------|--|---|--|
| t°. | Wt. of 1 cc. Solution. | Mols. per 100 Mols. H ₂ O. | Gms. per 100 Gms. H ₂ O. | Wt. of 1 cc. Solution. | Mols. per 100 Mols. C ₂ H ₅ OH. | Gms. per 100 Gms. C ₂ H ₅ OH | |
| 0 | 1.025 | 1.58 | 8.69 | 0.815 | 0.88 | 1.89 | |
| 10 | 1.035 | 2.4 | 14.0 | 0.809 | 1.35 | 2.7 | |
| 20 | 1.052 | 4.0 | 23.0 | 0.806 | 2.00 | 4.1 | |
| 25 | 1.067 | 5.9 | 33.0 | 0.805 | 2.5 | 5.3 | |
| 30 | 1.086 | 8.0 | 45.0 | 0.804 | 3.1 | 6.8 | |
| 40 | 1.120 | 12.8 | 70.0 | 0.809 | 4.9 | 10.5 | |
| 50 | 1.145 | 17.8 | 96.0 | 0.816 | 7.8 | 16.0 | |
| 60 | 1.167 | 22.6 | 124.0 | 0.835 | 12.3 | 26.5 | |
| 70 | 1.189 | 27.5 | 152.0 | 0.873 | ... | ... | |
| 80 | 1.204 | 32.8 | ... | 0.954 | ... | ... | |

SUCCHINIC NITRIL (Ethylene Cyanide) CNCH₂CH₂CN.

The solubility of succinic nitril in water and also in aqueous sodium chloride solutions at various temperatures has been determined by Schreinemaker (Z. physik. Chem. 23, 439, '97), and the results presented in terms of mols. of nitril per 100 mols. of nitril + H₂O. The following calculation of these results to gram quantities was made by Rothmund.

(Landolt and Börnstein, 3d ed. p. 596, '06.)

| t°. | Gms. CNCH ₂ CH ₂ CN per 100 Gms. | | t°. | Gms. CNCH ₂ CH ₂ CN per 100 Gms. | |
|------|--|---------------|--------------------|--|---------------|
| | Aq. Layer. | Nitril Layer. | | Aq. Layer. | Nitril Layer. |
| 18.5 | 10.2 | 92.0 | 53.5 | 33.2 | 66.4 |
| 20 | 11.0 | 91.5 | 55 | 40.3 | 62.8 |
| 39 | ... | 85.2 | 55.4 (crit. temp.) | 51.0 | |
| 45 | 22.0 | ... | | | |

SUGAR $C_{12}H_{22}O_{11}$ (Cane Sugar.)

SOLUBILITY IN WATER.

(Herzfeld — Z. Ver. Zuckerind. 181, '92; see also Courtonne — Ann. chim. phys. [5] 12, 569, '77.)

| t°. | Gms. $C_{12}H_{22}O_{11}$ per 100 Gms. | | t°. | Gms. $C_{12}H_{22}O_{11}$ per 100 Gms. | |
|-----|---|--------|-----|---|--------|
| | Solution. | Water. | | Solution. | Water. |
| 0 | 64.18 | 179.2 | 40 | 70.42 | 238.1 |
| 5 | 64.87 | 184.7 | 45 | 71.32 | 248.7 |
| 10 | 65.58 | 190.5 | 50 | 72.25 | 260.4 |
| 15 | 66.33 | 197.0 | 60 | 74.18 | 287.3 |
| 20 | 67.09 | 203.9 | 70 | 76.22 | 320.4 |
| 25 | 67.89 | 211.4 | 80 | 78.36 | 362.1 |
| 30 | 68.70 | 219.5 | 90 | 80.61 | 415.7 |
| 35 | 69.55 | 228.4 | 100 | 82.97 | 487.2 |

Sp. Gr. of sat. solution at 15° = 1.329; at 25° = 1.340.

SOLUBILITY OF SUGAR IN AQUEOUS SALT SOLUTIONS AT 30°, 50°,
AND 70°.

Interpolated from original results.

(Schukow — Z. Ver. Zuckerind. 50, 313, '00.)

| t°. | Gms. Salt per 100 Gms. H_2O . | Gms. $C_{12}H_{22}O_{11}$ per 100 grams H_2O in Aq. Solution of: | | | | |
|-----|------------------------------------|--|-------|-----------|-------|------------|
| | | KCl. | KBr. | KNO_3 . | NaCl. | $CaCl_2$. |
| 30 | 0 | 219.5 | 219.5 | 219.5 | 219.5 | 219.5 |
| " | 10 | 216 | 218 | 217 | 210 | 197 |
| " | 20 | 221 | 220 | 216 | 211 | 189 |
| " | 30 | 228 | 224 | 216 | 219 | 192 |
| " | 40 | 237 | 228 | 217 | 233 | 200 |
| " | 50 | ... | ... | 218 | 250 | 218 |
| " | 60 | ... | ... | ... | 269 | 243 |
| 50 | 0 | 260.4 | 260.4 | 260.4 | 260.4 | 260.4 |
| " | 10 | 261 | 262 | 260 | 255 | 239 |
| " | 20 | 266 | 266 | 261 | 260 | 228 |
| " | 30 | 274 | 272 | 262 | 269 | 228 |
| " | 40 | 284 | 276 | 262 | 284 | 236 |
| " | 50 | 296 | 280 | 263 | 302 | 253 |
| " | 60 | ... | ... | ... | ... | 276 |
| 70 | 0 | 320.5 | 320.5 | 320.5 | 320.5 | 320.5 |
| " | 10 | 326 | 324 | 321 | 323 | 295 |
| " | 20 | 334 | 328 | 324 | 330 | 286 |
| " | 30 | 345 | 334 | 327 | 344 | 286 |
| " | 40 | 357 | 341 | 331 | 361 | 295 |
| " | 50 | 370 | 349 | 334 | 384 | 308 |
| " | 60 | 384 | 357 | 337 | 406 | 327 |

SOLUBILITY OF CANE SUGAR IN SATURATED AQUEOUS SALT SOLUTIONS AT 31.25°.

(Köhler — Z. Ver. Zuckerind. 47, 447, '97.)

| Salt. | Gms. Sugar per 100 Gms. | | Salt. | Gms. Sugar per 100 Gms. | |
|---|-------------------------|--------|---------------------------------|-------------------------|--------|
| | Solution. | Water. | | Solution. | Water. |
| CH ₃ COOK | ... | 324.8 | Na ₂ CO ₃ | 64.73 | 229.2 |
| C ₂ H ₅ COOK | 49.19 | 306.1 | KNO ₃ | 61.36 | 224.7 |
| C ₂ H ₅ .OH.(COOK) ₂ | 50.30 | 303.9 | K ₂ SO ₄ | 66.74 | 219.0 |
| K ₂ CO ₃ | 56.0 | 265.4 | CH ₃ COOCa | 60.12 | 190.0 |
| KCl | 62.28 | 246.5 | Na ₂ SO ₄ | 52.20 | 183.7 |
| CH ₃ COONa | 59.93 | 237.6 | CaCl ₂ | 42.84 | 135.1 |
| NaCl | 62.17 | 236.3 | MgSO ₄ | 46.52 | 119.6 |

SOLUBILITY OF CANE SUGAR IN AQUEOUS ALCOHOL SOLUTIONS.

(Scheibler — Ber. 5, 343, '72; correction Ber. 24, 434, '91.)

| Results at 0°. | | | | Results at 14°. | | | Results at 40°. |
|-------------------|-------------------------------|----------------------------------|-------------------------------|----------------------------|-----------------------------------|-------------------|----------------------------------|
| Per cent Alcohol. | Sp. Gr. of Solution at 17.5°. | Gms. Sugar per 100 cc. Solution. | Sp. Gr. of Solution at 17.5°. | Gms. per 100 cc. Solution. | | | Gms. Sugar per 100 cc. Solution. |
| | | | | Sugar. | C ₂ H ₅ OH. | H ₂ O. | |
| 0 | 1.325 | 85.8 | 1.826 | 87.5 | 0 | 45.10 | ... |
| 10 | 1.299 | 80.7 | 1.300 | 81.5 | 3.91 | 44.82 | 95.4 |
| 20 | 1.236 | 74.2 | 1.266 | 74.5 | 8.52 | 43.83 | 90.0 |
| 30 | 1.229 | 65.5 | 1.233 | 67.9 | 13.74 | 41.87 | 82.2 |
| 40 | 1.182 | 56.7 | 1.185 | 58.0 | 20.24 | 40.38 | 74.9 |
| 50 | 1.129 | 45.9 | 1.131 | 47.1 | 28.13 | 38.02 | 63.4 |
| 60 | 1.050 | 32.9 | 1.058 | 33.9 | 37.64 | 34.47 | 49.9 |
| 70 | 0.972 | 18.2 | 0.975 | 18.8 | 46.28 | 29.57 | 31.4 |
| 80 | 0.893 | 6.4 | 0.895 | 6.6 | 61.15 | 21.95 | 13.3 |
| 90 | 0.887 | 0.7 | 0.838 | 0.9 | 71.18 | 12.83 | 2.8 |
| 97.4 | 0.806 | 7.1 | 0.808 | 0.36 | 77.39 | 3.28 | 0.5 |

SOLUBILITY OF CANE SUGAR IN AQUEOUS ALCOHOL SOLUTIONS AT 14°.

(Schrefeld — Z. Ver. Zuckerind. 44, '971 '94.)

| Wt. per cent Alcohol. | Wt. per cent Sugar. | Gms. Sugar per 100 cc. Alcohol-H ₂ O Mixture. | Wt. per cent Alcohol. | Wt. per cent Sugar. | Gms. Sugar per 100 cc. Alcohol-H ₂ O Mixture. |
|-----------------------|---------------------|--|-----------------------|---------------------|--|
| 0 | 66.2 | 195.8 | 50 | 38.55 | 62.7 |
| 5 | 64.25 | 179.7 | 60 | 26.70 | 36.4 |
| 10 | 62.20 | 164.5 | 70 | 12.25 | 13.9 |
| 20 | 58.55 | 141.2 | 80 | 4.05 | 4.2 |
| 30 | 54.05 | 117.8 | 90 | 0.95 | 0.9 |
| 40 | 47.75 | 91.3 | 100 | 0.00 | 0.0 |

100 gms. absolute methyl alcohol dissolve 1.18 gms. sugar at 19°.

(de Bruyn — Z. physik. Chem. 10, 784, '92.)

SOLUBILITY OF SUGARS IN PYRIDINE AT 26°.

(Holty — J. Physic. Chem. 9, 764, '04.)

| Sugar. | Formula. | Gms. Sugar per 100 Gms. Solution. | Sp. Gr. of Solutions. |
|-------------|---|-----------------------------------|-----------------------|
| Cane Sugar | C ₁₂ H ₂₂ O ₁₁ | 6.45 | ... |
| Milk Sugar | C ₁₂ H ₂₂ O ₁₁ .H ₂ O | 2.18 | 0.9811 |
| Grape Sugar | C ₆ H ₁₂ O ₆ .H ₂ O | 7.62 | 1.0521 |

SOLUBILITY OF CANE SUGAR IN AQUEOUS ACETONE AT 25°.

(Herz and Knoch — Z. anorg. Chem. 41, 322, '04.)

| Sp. Gr. of Solutions. | cc. Acetone per 100 cc. Solvent. | Gms. Sugar per 100 cc. Solution. | Gms. per 100 cc. Solution. | | |
|-----------------------|----------------------------------|----------------------------------|----------------------------|-------------------------------------|---|
| | | | H ₂ O. | (CH ₃) ₂ CO. | C ₁₂ H ₂₂ O ₁₁ . |
| 1.3306 | 0.0 | 89.8 | 43.3 | 0.0 | 89.8 |
| 1.2796 | 20.0 | 76.7 | 42.9 | 8.4 | 76.7 |
| 1.2491 | 30.0 | 72.1 | 39.5 | 13.4 | 72.1 |
| 1.2002 | 40.0 | 59.3 | 39.8 | 20.9 | 59.3 |
| 1.1613 | 45.0 | 52.5 | 39.0 | 24.6 | 52.5 |

Above 45 cc. acetone per 100 cc. solvent the solution begins to separate into two layers. The lower of these contains 51 gms. sugar per 100 cc. and has Sp. Gr. 1.1522. The upper layer contains so little sugar that the amount could not be determined by the method employed. 100 cc. evaporated in a vacuum desiccator left a residue of 3.68 gms. Above the concentration of 80 cc. acetone per 100 cc. solvent the two layers unite. In pure acetone 100 cc. solution give a residue of 0.18 gram sugar.

SOLUBILITY OF GRAPE SUGAR IN WATER AND IN AQ. ALCOHOL.

100 gms. H₂O dissolve 81.68 gms. C₆H₁₂O₆ or 97.85 gms. C₆H₁₂O₆.H₂O at 15°.

100 gms. aq. alcohol of 0.837 Sp. Gr. = 85 wt. per cent dissolve 1.95 gms. C₆H₁₂O₆ at 17.5°.

100 gms. aq. alcohol of 0.880 Sp. Gr. = 66 wt. per cent dissolve 8.10 gms. C₆H₁₂O₆ at 17.5°.

100 gms. aq. alcohol of 0.910 Sp. Gr. = 53 wt. per cent dissolve 16.01 gms. C₆H₁₂O₆ at 17.5°.

100 gms. aq. alcohol of 0.915 Sp. Gr. = 51 wt. per cent dissolve 32.50 gms. C₆H₁₂O₆ at 17.5°.

SOLUBILITY OF MILK SUGAR IN WATER AND IN ABSOLUTE METHYL ALCOHOL.

100 gms. H₂O dissolve 17.03 gms. C₁₂H₂₂O₁₁.H₂O at 10°, 20.8 gms. at 25° (U. S. P.), 40 gms. at 100°, and 100 gms. at b. pt.

100 gms. abs. methyl alcohol dissolve 0.084 gm. at 19.5°.

(de Bruyn — Z. physik. Chem. 10, 784, '92.)

SULPHANILIC ACID NH₂.C₆H₄.SO₃H.

SOLUBILITY IN WATER.

(Dolinski — Ber. 38, 1836, '05.)

| t°. | Gms. Acid per 100 Gms. | | t°. | Gms. Acid per 100 Gms. | |
|-----|------------------------|--------|-----|------------------------|--------|
| | Solution. | Water. | | Solution. | Water. |
| 0 | 0.64 | 0.64 | 60 | 3.01 | 3.10 |
| 10 | 0.83 | 0.84 | 70 | 3.65 | 3.78 |
| 20 | 1.07 | 1.08 | 80 | 4.32 | 4.51 |
| 30 | 1.47 | 1.49 | 90 | 5.25 | 5.54 |
| 40 | 1.94 | 1.97 | 100 | 6.26 | 6.67 |
| 50 | 2.44 | 2.51 | | | |

SULPHUR S

SOLUBILITY IN:

Tin Tetra Chloride.
(Gerardin — Ann. chim. phys. [4] 5, 134, '65.)

| t°. | Gms. S. per 100 Gms. SnCl ₄ . | Solid Phase. |
|-----|--|-----------------|
| 99 | 5.8 | Solid S |
| 101 | 6.2 | " |
| 110 | 8.7-9.1 | " |
| 112 | 9.4-9.9 | Liquid S |
| 121 | 17.0 | " |

Amyl Alcohol.
(Gerardin.)

| t°. | Gms. S. per 100 Gms. C ₅ H ₁₁ OH. | Solid Phase. |
|-----|---|-----------------|
| 95 | 1.5 | Solid S |
| 110 | 2.1-2.2 | " |
| 112 | 2.6-2.7 | Liquid S |
| 120 | 3.0 | " |
| 131 | 5.3 | " |

SOLUBILITY OF SULPHUR IN ETHYL AND METHYL ALCOHOLS.

| t°. | Alcohol. | Gms. per 100 Gms. Alcohol. | Authority. |
|--------|-------------|----------------------------------|---|
| 15 | Abs. Ethyl | 0.051 | (Pohl.) |
| 18.5 | " | 0.053 | (de Bruyn — Z. physik. Chem. 10, 781, '92.) |
| b. pt. | " | 0.42 | (Payen — Compt. rend. 34, 356, '52.) |
| 18.5 | Abs. Methyl | 0.028 | (de Bruyn.) |

SOLUBILITY OF SULPHUR IN AQUEOUS ACETONE AT 25°.

(Herz and Knoch — Z. anorg. Chem. 45, 263, '05.)

| Wt. per cent Acetone in Solvent. | Sulphur per 100 cc. Solution. | | Sp. Gr. of Solution. |
|--|----------------------------------|--------|----------------------------|
| | Millimols. | Grams. | |
| 100 | 65.0 | 2.084 | 0.7854 |
| 95.36 | 45.0 | 1.442 | 0.7911 |
| 90.62 | 33.0 | 1.058 | 0.8165 |
| 85.38 | 25.3 | 0.811 | 0.8295 |

SOLUBILITY OF SULPHUR IN BENZENE AND IN ETHYLENE DI
BROMIDE.

(Etard — Ann. chim. phys. [7] 2, 571, '94; see also Cossa — Ber. 1, 130, '68.)

| In C ₆ H ₆ . | | | | In C ₂ H ₄ Br ₂ . | | | |
|------------------------------------|--------------------------------------|-----|--------------------------------------|--|--------------------------------------|-----|--------------------------------------|
| t°. | Gms. S. per 100 Gms. Solution. | t°. | Gms. S. per 100 Gms. Solution. | t°. | Gms. S. per 100 Gms. Solution. | t°. | Gms. S. per 100 Gms. Solution. |
| 0 | 1.0 | 70 | 8.0 | 0 | 1.2 | 50 | 6.4 |
| 10 | 1.3 | 80 | 10.5 | 10 | 1.7 | 60 | 8.4 |
| 20 | 1.7 | 90 | 13.8 | 20 | 2.3 | 70 | 11.4 |
| 25 | 2.1 | 100 | 17.5 | 25 | 2.8 | 80 | 16.5 |
| 30 | 2.4 | 110 | 23.0 | 30 | 3.3 | 90 | 24.0 |
| 40 | 3.2 | 120 | 29.0 | 40 | 4.4 | 100 | 36.5 |
| 50 | 4.3 | 130 | 36.0 | | | | |
| 60 | 6.0 | | | | | | |

100 gms. sat. solution of S in benzoyl chloride, C₇H₇Cl, contain 1 gram S at 0° and 55.8 gms. at 134°.

(Bogousky — J. Soc. Phys. Chim. R. 37, 92, '05.)

SOLUBILITY OF SULPHUR IN CARBON BISULPHIDE.

(Etard — Ann. chim. phys. [7] 2, 571, '94; Cossa — Ber. 1, 138, '65; at 10°, Retgers — Z. anorg. Chem. 3, 347, '93; below — 77°, Arctowski — Ibid. 11, 274, '95-'96.)

| t°. | Gms. S per 100 Gms. | | t°. | Gms. S per 100 Gms. | | t°. | Gms. S per 100 Gms. | |
|------|---------------------|-----------------|-----|---------------------|-----------------|-----|---------------------|-----------------|
| | Solution. | CS ₂ | | Solution. | CS ₂ | | Solution. | CS ₂ |
| -110 | 3.0 | 3.1 | -10 | 13.5 | 15.6 | 50 | 59.0 | 143.9 |
| -100 | 3.5 | 3.6 | 0 | 18.0 | 22.0 | 60 | 66.0 | 194.1 |
| -80 | 4.0 | 4.2 | 10 | 23.0* | 29.9 | 70 | 72.0 | 257.1 |
| -60 | 3.5 | 3.6 | 20 | 29.5 | 41.8 | 80 | 79.0 | 376.1 |
| -40 | 6.0 | 6.4 | 25 | 33.5 | 50.4 | 90 | 86.0 | 614.1 |
| -20 | 10.5 | 11.7 | 30 | 38.0 | 61.3 | 100 | 92.0 | 1150.0 |
| | | | 40 | 50.0 | 100.0 | | | |

* 26.4 R.

Sp. Gr. of solution saturated at 15° containing 26 gms. S per 100 gms. solution = 1.372.

SOLUBILITY OF SULPHUR IN HEXANE (C₆H₁₄).

(Etard.)

| t°. | Gms. S per 100 Gms. Solution. | t°. | Gms. S per 100 Gms. Solution. | t°. | Gms. S per 100 Gms. Solution. |
|-----|-------------------------------|-----|-------------------------------|-----|-------------------------------|
| -20 | 0.07 | 60 | 1.0 | 130 | 5.2 |
| 0 | 0.16 | 80 | 1.7 | 140 | 6.0 |
| 20 | 0.25 | 100 | 2.8 | 160 | 7.2 |
| 40 | 0.55 | 120 | 4.4 | 180 | 8.2 |

SOLUBILITY OF SULPHUR IN SEVERAL SOLVENTS.

(Cossa — Ber. 1, 139, '68; Retgers; Cap and Garot — J. pharm. chim. [3] 26, 81 '54; Kleven — Chem. Centralb. 434, '72.)

| Solvent. | t°. | Gms. S per 100 Gms. Solvent. | Solvent. | t°. | Gms. S per 100 Gms. Solvent. |
|---|------|------------------------------|---|---------|------------------------------|
| C ₆ H ₅ NH ₂ | 130 | 85.3 | C ₆ H ₅ CH ₃ | 230 | 1.48 |
| CHCl ₃ | 22 | 1.21 | CH ₂ I ₂ | 10 | 10.0 (R.) |
| (C ₂ H ₅) ₂ O | 23.5 | 0.97 | C ₁₀ H ₈ N ₂ * | 100 | 10.58 |
| C ₆ H ₅ OH | 174 | 16.35 | C ₆ H ₅ (OH) ₃ | ord. t. | 0.05-0.1 (C. and G.) |

* Nicotine.

SOLUBILITY OF SULPHUR IN COAL TAR OIL, LINSEED OIL AND IN OLIVE OIL.

(Pelouze — Compt. rend. 68, 1179, '69; 69, 56, '69; Pohl.)

| Grams S per 100 Grams Coal Tar Oil of: | | | | | | | G. S per 100 Gms. | |
|--|------------------------------------|-------------------|---------------------|---------------------|--------------------|--------------------|-------------------------------|-------------------------------|
| t°. | Sp. Gr.: 0.87 b. pt.: 80°-100°. | 0.88 85°-120°. | 0.882 120°-220°. | 0.885 150°-200°. | 1.01 210°-300°. | 1.02 220°-300°. | Linseed Oil. 0.885 Sp. Gr. | Olive Oil of 0.885 Sp. Gr. |
| 15 | 2.1 | 2.3 | 2.5 | 2.6 | 6.0 | 7.0 | 0.4 | 2.3 |
| 30 | 3.0 | 4.0 | 5.3 | 5.8 | 8.5 | 8.5 | 0.6 | 4.3 |
| 50 | 5.2 | 6.1 | 8.3 | 8.7 | 10.0 | 12.0 | 1.2 | 9.0 |
| 80 | 11.8 | 13.7 | 15.2 | 21.0 | 37.0 | 41.0 | 2.2 | 18.0 |
| 100 | 15.2 | 18.7 | 23.0 | 26.4 | 52.5 | 54.0 | 3.0 | 25.0 |
| 110 | ... | 23.0 | 26.2 | 31.0 | 105.0 | 115.0 | 3.5 | 30.0 |
| 120 | ... | 27.0 | 32.0 | 38.0 | ∞ | ∞ | 4.2 | 37.0 |
| 130 | ... | ... | 38.7 | 43.8 | ∞ | ∞ | 5.0 | 43.0 |
| | | | | | | | (160°) | 10.0 |

100 gms. oil of turpentine dissolve 1.35 gms. S at 16°, and 16.2 gms. at b. pt.

(Payen — Compt. rend. 34, 356, '52.)

SULPHUR DIOXIDE SO_2 .

SOLUBILITY IN WATER.

(Schönfeld — Liebig's Ann. 95, 5, '55; Sims — *Ibid.* 118, 340, '61; Roozeboom — Rec. trav. chim. 3, 46, '84.)

| Schönfeld. | | | | Sims. | | | Roozeboom. | |
|------------|--|------------------------|--|-------|--|-------|------------|---|
| t°. | Vols. SO_2 (at 0° and 760 mm.) per 1 Vol. | | Gms. SO_2 per 100 Gms. H_2O at total pressure 760 mm. | t°. | SO_2 per 1 Gm. H_2O . | | t°. | SO_2 Dissolved per 1 pt. H_2O at 760 mm. pressure. |
| | Sat. SO_2 + Aq. | H_2O . | | | Gms. | Vols. | | |
| 0 | 68.86 | 79.79 | 22.83 | 8 | 0.168 | 58.7 | 0 | 0.236 |
| 5 | 59.82 | 67.48 | 19.31 | 10 | 0.154 | 53.9 | 2 | 0.218 |
| 10 | 51.38 | 56.65 | 16.21 | 14 | 0.130 | 45.6 | 4 | 0.201 |
| 15 | 43.56 | 47.28 | 13.54 | 20 | 0.104 | 36.4 | 6 | 0.184 |
| 20 | 36.21 | 39.37 | 11.29 | 26 | 0.087 | 30.5 | 7 | 0.176 |
| 25 | 30.77 | 32.79 | 9.41 | 30 | 0.078 | 27.3 | 8 | 0.168 |
| 30 | 25.82 | 27.16 | 7.81 | 36 | 0.065 | 22.8 | 10 | 0.154 |
| 35 | 21.23 | 22.49 | ... | 40 | 0.058 | 20.4 | | |
| 40 | 17.01 | 18.77 | 5.41 | 46 | 0.050 | 17.4 | 12 | 0.142 |
| | | | | 50 | 0.045 | 15.6 | | |

Sp. Gr. of sat. solution at 0° = 1.061; at 10°, 1.055; at 20° = 1.024.
 1 gm. H_2O dissolves 0.0909 gm. SO_2 = 34.73 cc. (measured at 25°)
 at 25° and 748 mm. pressure.

(Walden and Centnerszwer — Z. physik. Chem. 42, 462, '01-'02.)

SOLUBILITY OF SULPHUR DIOXIDE IN SULPHURIC ACID OF
1.84 SP. GR.

Interpolated from original results.

(Dunn — Chem. News, 45, 272, '82.)

| t°. | Sp. Gr. of Sat. Solution. | Coefficient of Absorption (760 mm.). | t°. | Sp. Gr. of Sat. Solution. | Coefficient of Absorption (760 mm.). |
|-----|---------------------------|--------------------------------------|-----|---------------------------|--------------------------------------|
| 0 | ... | 53.0 | 50 | 1.8186 | 9.5 |
| 10 | 1.8232 | 35.0 | 60 | 1.8165 | 7.0 |
| 20 | 1.8225 | 25.0 | 70 | 1.8140 | 5.5 |
| 25 | 1.8221 | 21.0 | 80 | 1.8112 | 4.5 |
| 30 | 1.8216 | 18.0 | 90 | 1.8080 | 4.0 |
| 40 | 1.8205 | 13.0 | | | |

SOLUBILITY OF SULPHUR DIOXIDE IN AQUEOUS SULPHURIC ACID SOLUTIONS.

(Dunn; see also Kolb — Bull. soc. ind. Mulhouse — 222, '72.)

| t°. | Sp. Gr. of H_2SO_4 Solution. | Approximate Per cent H_2SO_4 . | Coefficient of Absorption. | t°. | Sp. Gr. of H_2SO_4 Solution. | Approximate per cent H_2SO_4 . | Coefficient of Absorption. |
|-----|--|--|----------------------------|------|--|--|----------------------------|
| 6.9 | 1.139 | 20 | 48.67 | 15.2 | 1.173 | 25 | 31.82 |
| 6.9 | 1.300 | 40 | 45.38 | 16.8 | 1.151 | 21 | 31.56 |
| 8.6 | 1.482 | 58 | 39.91 | 14.8 | 1.277 | 36 | 30.41 |
| 9.8 | 1.703 | 78 | 29.03 | 15.1 | 1.458 | 56 | 29.87 |
| 5.5 | 1.067 | 10 | 36.78 | 15.6 | 1.609 | 70 | 25.17 |
| 6.0 | 1.102 | 15 | 3.408 | 15.0 | 1.739 | 81 | 20.83 |

For Coefficient of Absorption, see Ethane page 133.

SOLUBILITY OF SULPHUR DIOXIDE IN AQUEOUS SALT SOLUTIONS.

(Fox — Z. physik. Chem. 41, 461, '02.)

Results in terms of the Ostwald Solubility Expression. See page 105.

| Aqueous Salt Solution. | Solubility Coefficient l of SO_2 in aq. Solutions of Concentrations: | | | | | |
|------------------------------|---|--------|--------|--------|--------|--------|
| | 0.5 Normal | 1.0 N. | 1.5 N. | 2.0 N. | 2.5 N. | 3.0 N. |
| NH_4Cl | $l_{25}=34.58$ | 36.37 | 38.06 | 39.76 | 41.37 | 42.78 |
| NH_4Br | $l_{25}=36.25$ | 39.46 | 42.78 | 46.06 | 49.17 | 52.25 |
| NH_4CNS | $l_{25}=37.78$ | 42.74 | 47.26 | 52.26 | 57.01 | 61.46 |
| NH_4NO_3 | $l_{25}=33.96$ | 35.07 | 36.28 | 37.27 | 38.01 | 39.14 |
| NH_4NO_3 | $l_{35}=23.35$ | 24.23 | 24.78 | 25.57 | 26.66 | 27.43 |
| $(\text{NH}_4)_2\text{SO}_4$ | $l_{25}=33.35$ | 33.82 | 34.33 | 34.95 | 35.47 | 35.96 |
| $(\text{NH}_4)_2\text{SO}_4$ | $l_{35}=22.91$ | 23.14 | 23.49 | 23.93 | 24.23 | 24.60 |
| CdCl_2 | $l_{25}=31.66$ | 30.55 | 29.46 | 28.16 | 27.09 | 26.06 |
| CdCl_2 | $l_{35}=21.73$ | 21.23 | 20.55 | 20.02 | 19.23 | 18.68 |
| CdBr_2 | $l_{25}=31.91$ | 31.01 | 30.17 | 29.27 | 28.15 | 27.46 |
| CdBr_2 | $l_{35}=21.88$ | 21.46 | 20.81 | 20.60 | 19.70 | 19.17 |
| CdI_2 | $l_{25}=33.27$ | 33.76 | 34.16 | 34.74 | 34.98 | 35.77 |
| CdI_2 | $l_{35}=22.75$ | 23.06 | 23.36 | 23.71 | 23.99 | 24.30 |
| CdSO_4 | $l_{25}=31.11$ | 29.71 | 28.24 | 26.58 | 25.14 | 23.76 |
| CdSO_4 | $l_{35}=21.45$ | 20.43 | 19.42 | 18.31 | 17.41 | 16.25 |
| KCl | $l_{25}=34.42$ | 36.05 | 37.76 | 39.32 | 40.96 | 42.27 |
| KCl | $l_{35}=23.74$ | 25.15 | 26.54 | 27.94 | 28.93 | 30.02 |
| KBr | $l_{25}=35.94$ | 39.11 | 42.41 | 44.96 | 48.87 | 52.26 |
| KBr | $l_{35}=24.83$ | 27.49 | 29.64 | 31.93 | 34.12 | 36.14 |
| KCNS | $l_{25}=37.57$ | 42.38 | 47.02 | 51.81 | 55.87 | 61.26 |
| KCNS | $l_{35}=25.63$ | 28.79 | 32.03 | 35.05 | 38.13 | 42.94 |
| KI | $l_{25}=38.66$ | 44.76 | 50.58 | 56.75 | 62.63 | 68.36 |
| KI | $l_{35}=26.30$ | 30.25 | 34.64 | 38.04 | 41.87 | 45.43 |
| KNO_3 | $l_{25}=33.80$ | 34.79 | 35.77 | 36.66 | 37.57 | 38.52 |
| KNO_3 | $l_{35}=23.27$ | 24.03 | 24.79 | 25.72 | 26.54 | 27.33 |
| K_2SO_4 | $l_{25}=33.20$ | 33.61 | ... | ... | ... | ... |
| NaBr | $l_{25}=33.76$ | 34.54 | 35.27 | 36.26 | 36.84 | 37.74 |
| NaCl | $l_{25}=32.46$ | 32.25 | 31.96 | 31.76 | 31.51 | 31.36 |
| NaCNS | $l_{25}=35.44$ | 38.24 | 40.78 | 43.37 | 45.86 | 48.34 |
| Na_2SO_4 | $l_{25}=31.96$ | 31.14 | 30.45 | 29.51 | 28.66 | 28.44 |
| Na_2SO_4 | $l_{35}=21.88$ | 21.35 | 20.81 | 20.21 | 19.75 | 19.27 |

SOLUBILITY OF SULPHUR DIOXIDE IN ALCOHOLS AND IN OTHER SOLVENTS.

(de Bruyn — Rec. trav. chim. 11, 128, '92; Schulze — J. pr. Chem. [2] 24, 168, '81.)

| t° . | In Ethyl Alcohol at 760 mm. | | In Methyl Alcohol at 760 mm. | | In Several Solvents at 0° and 725 mm. (S.) | | |
|-------------|---------------------------------|-----------------------------------|---------------------------------|--------------------------|--|---------------------------------------|-------|
| | Gms. SO_2 per 100 Gms. | | Gms. SO_2 per 100 Gms. | | Solvent. | Gms. SO_2 per 1 Gm. Solvent. | |
| | Solution. | $\text{C}_2\text{H}_5\text{OH}$. | Solution. | CH_3OH . | | Grams. | Vols. |
| 0 | 53.5 | 115.0 | 71.1 | 246.0 | Camphor | 0.880 | 308 |
| 7 | 45.0 | 81.0 | 59.9 | 149.4 | CH_3COOH | 0.961 | 318 |
| 12.3 | 39.9 | 66.4 | 52.2 | 109.2 | HCOOH | 0.821 | 351 |
| 18.2 | 32.8 | 48.8 | (17.8°) 44.0 | 78.6 | $(\text{CH}_3)_2\text{CO}$ | 2.07 | 589 |
| 26.0 | 24.4 | 32.3 | 31.7 | 46.4 | SO_2Cl_2 | 0.323 | 189 |

DISTRIBUTION OF SULPHUR DIOXIDE AT 20° BETWEEN:

(McCrae and Wilson — Z. anorg. Chem. 35, 11, '03.)

| Water and Chloroform. | | | | Conc. of HCl. | Aq. HCl and Chloroform. | | | |
|---------------------------------------|-----------------------------|---|-----------------------------|---------------------|---------------------------------------|-----------------------------|---|-----------------------------|
| Gms. SO ₂ per Liter in: | | Gm. Equiv. $\frac{1}{2}$ SO ₂ per Liter in: | | | Gms. SO ₂ per Liter in: | | Gm. Equiv. $\frac{1}{2}$ SO ₂ per Liter in: | |
| Aq. Layer. | CHCl ₃ Layer. | Aq. Layer. | CHCl ₃ Layer. | | Aq. Layer. | CHCl ₃ Layer. | Aq. Layer. | CHCl ₃ Layer. |
| 1.738 | 1.123 | 0.0543 | 0.0351 | 0.05 | 1.86 | 1.46 | 0.0581 | 0.0456 |
| 1.753 | 1.122 | 0.0547 | 0.0350 | " | 3.07 | 2.83 | 0.0960 | 0.0884 |
| 2.346 | 1.703 | 0.0732 | 0.0532 | " | 4.28 | 4.07 | 0.1336 | 0.1271 |
| 2.628 | 1.897 | 0.0821 | 0.0592 | " | 5.34 | 5.42 | 0.1667 | 0.1692 |
| 3.058 | 2.385 | 0.0955 | 0.0745 | 0.10 | 1.25 | 1.41 | 0.039 | 0.044 |
| 3.735 | 3.062 | 0.1166 | 0.0956 | " | 2.78 | 3.08 | 0.0868 | 0.0962 |
| 4.226 | 3.626 | 0.1319 | 0.1132 | " | 3.86 | 4.08 | 0.1199 | 0.1275 |
| 5.269 | 4.798 | 0.1645 | 0.1498 | " | 5.161 | 5.72 | 0.1612 | 0.1784 |
| 6.588 | 6.183 | 0.2057 | 0.1930 | 0.2 | 1.268 | 1.51 | 0.0396 | 0.0471 |
| 31.92 | 33.84 | 0.9968 | 1.056 | " | 1.914 | 2.27 | 0.0597 | 0.0710 |
| 33.26 | 37.25 | 1.038 | 1.163 | " | 2.464 | 3.04 | 0.0769 | 0.0949 |
| | | | | " | 3.967 | 4.90 | 0.1239 | 0.1530 |
| | | | | 0.4 | 1.202 | 1.61 | 0.038 | 0.0504 |
| | | | | " | 1.894 | 2.26 | 0.059 | 0.0706 |

TANNIC ACID C₁₂H₈O₇COOH.

100 gms. H₂O dissolve about 294 gms. at 25°; 100 gms. alcohol dissolve about 439 gms. at 25°.

(U. S. P.)

TARTARIC ACID C₂H₄(OH)₂(COOH)₂.

SOLUBILITY IN WATER.

(Leidie — Compt. rend. 95, 87, '82.)

| t°. | Grams Tartaric Acid per 100 Gms. H ₂ O. | | | t°. | Gms. Tartaric Acid per 100 Gms. H ₂ O. | | |
|-----|--|------------------------------|-----------------------------|-----|---|------------------------------|-----------------------------|
| | Dextro and Laevo Acids. | Racemic Ac. Anhydrous. | Racemic Ac. Hydrated. | | Dextro and Laevo Acids. | Racemic Ac. Anhydrous. | Racemic Ac. Hydrated. |
| 0 | 115.04 | 8.16 | 9.23 | 50 | 195.0 | 50.0 | 59.54 |
| 10 | 125.72 | 12.32 | 14.00 | 60 | 217.55 | 64.52 | 78.33 |
| 20 | 139.44 | 18.0 | 20.60 | 70 | 243.66 | 80.56 | 99.88 |
| 25 | 147.44 | 21.4 | 24.61 | 80 | 273.33 | 98.12 | 124.56 |
| 30 | 156.2 | 25.2 | 29.10 | 90 | 306.56 | 117.20 | 152.74 |
| 40 | 176.0 | 37.0 | 43.32 | 100 | 343.35 | 137.80 | 184.91 |

SOLUBILITY OF TARTARIC ACID IN ALCOHOL AND IN ETHER

AT 15°.

(Bourgoin — Ann. chim. phys. [5] 13, 405, '78.)

| Solvent. | Gms. Tartaric Acid per 100 Gms. | |
|------------------|---------------------------------|----------|
| | Sat. Solution. | Solvent. |
| Absolute Alcohol | 20.385 | 41.135 |
| 90% Alcohol | 29.146 | 25.604 |
| Absolute Ether | 0.389 | 0.40 |

TELLURIUM Te.

100 gms. methylene iodide CH₂I₂ dissolve 0.1 gm. Te at 12°.

(Retgers — Z. anorg. Chem. 3, 349, '93)

TELLURIC ACID

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TELLURIC ACID $H_2TeO_4 \cdot 2H_2O$.

SOLUBILITY IN WATER.

(Mylius — Ber. 34, 2208, '01.)

| t°. | Gms. H_2TeO_4 per 100 Gms. Sol. | Mols. H_2TeO_4 per 100 Mols. H_2O . | Solid Phase. | t°. | Gms. H_2TeO_4 per 100 Gms. Sol. | Mols. H_2TeO_4 per 100 Mols. H_2O . | Solid Phase. |
|-----|--|--|------------------------|-----|--|--|------------------------|
| 0 | 13.92 | 1.51 | $H_2TeO_4 \cdot 6H_2O$ | 30 | 33.36 | 4.67 | $H_2TeO_4 \cdot 2H_2O$ |
| 5 | 17.84 | 2.03 | " | 40 | 36.38 | 5.33 | " |
| 10 | 26.21 | 3.31 | " | 60 | 43.67 | 7.04 | " |
| 15 | 32.79 | 4.41 | " | 80 | 51.55 | 9.93 | " |
| 10 | 25.29 | 3.15 | $H_2TeO_4 \cdot 2H_2O$ | 100 | 60.84 | 14.52 | " |
| 18 | 28.90 | 3.82 | " | 110 | 67.0 | 19.0 | " |

TELLURIUM ALUMS.

SOLUBILITY IN WATER AT 25°.

(Locke — Am. Ch. J. 26, 174, '01.)

| Alum. | Formula. | Salt per 100 Grams H_2O . | | |
|------------------|-----------------------------|-----------------------------|-------------------|--------------|
| | | Gms. Anhydrous. | Gms. Hydrated. | Gm. Mols. |
| Te Aluminum Alum | $TeAl(SO_4)_2 \cdot 12H_2O$ | 7.5 | 11.78 | 0.0177 |
| Te Vanadium Alum | $TeV(SO_4)_2 \cdot 12H_2O$ | 25.6 | 43.31 | 0.0573 |
| Te Chromium Alum | $TeCr(SO_4)_2 \cdot 12H_2O$ | 10.48 | 16.38 | 0.0212 |
| Te Iron Alum | $TeFe(SO_4)_2 \cdot 12H_2O$ | 36.15 | 64.6 | 0.0799 |

TELLURIUM BROMATE $TeBrO_3$.

100 cc. aq. solution contain 0.02216 g. mols. or 5.663 grams $TlBrO_3$, at 39.75°.

(Noyes and Abbott — Z. physik. Chem. 16, 130, '95.)

TELLURIUM BROMIDE $TeBr$.

SOLUBILITY IN AQUEOUS SOLUTIONS OF TELLURIUM NITRATE

AT 68.5°.

(Noyes — Z. physik. Chem. 6, 248, '90.)

| Gram Molecules per Liter. | | | | Grams per Liter. | | | |
|---------------------------|----------|---------|--------|------------------|----------|-------|--------|
| 0 | $TeNO_3$ | 0.00869 | $TeBr$ | 0.00 | $TeNO_3$ | 1.804 | $TeBr$ |
| 0.0163 | " | 0.00410 | " | 3.091 | " | 0.851 | " |
| 0.0294 | " | 0.00289 | " | 5.576 | " | 0.600 | " |
| 0.0955 | " | 0.00148 | " | 18.110 | " | 0.307 | " |

SOLUBILITY OF TELLURIUM DOUBLE BROMIDES AND CHLORIDES IN AQUEOUS HYDROCHLORIC AND HYDROBROMIC ACIDS

AT 22°.

(Wheeler — Z. anorg. Chem. 3, 432, '93.)

| Tellurium Double Salt. | Formula. | Solvent. | Gms. Double Salt per 100 Gms. Solvent | |
|------------------------|----------------------|----------|--|-----------------|
| | | | of 1.49 Sp. Gr. | of 1.08 Sp. Gr. |
| Te Caesium Bromide | $TeBr_4 \cdot 2CsBr$ | Aq. HBr | 0.02 | 0.13 |
| Te Potassium Bromide | $TeBr_4 \cdot 2KBr$ | " | 6.57 | 62.90 |
| Te Rubidium Bromide | $TeBr_4 \cdot 2RbBr$ | " | 0.25 | 3.88 |
| Te Caesium Chloride | $TeCl_4 \cdot 2CsCl$ | Aq. HCl* | 0.05 | 0.78 |
| Te Rubidium Chloride | $TeCl_4 \cdot 2RbCl$ | " | 0.34 | 13.09 |

* Sp. Gr. of Aq. HCl solutions 1.2 and 1.05 respectively.

TELLURIUM CHLORIDE TeCl_4 .SOLUBILITY IN WATER AND IN AQ. SALT SOLUTIONS AT 25° .

(Noyes; Noyes and Abbott; Geffcken — Z. physik. Chem. 49, 296, '04.)

| Aq. Salt Solution. | G. Mols. per Liter. | | Grams per Liter. | |
|--|---------------------|-------------------|------------------|-------------------|
| | Salt. | TeCl_4 . | Salt. | TeCl_4 . |
| Ammonium Nitrate NH_4NO_3 | 0.0 | 0.0161 | 0.0 | 2.625 (G.) |
| " | 0.5 | 0.02587 | 40.05 | 4.218 |
| " | 1.0 | 0.03121 | 80.11 | 5.089 |
| " | 2.0 | 0.03966 | 160.22 | 6.468 |
| Barium Chloride BaCl_2 | 0.0283 | 0.00857 | 5.895 | 1.397 (N.) |
| " | 0.1468 | 0.00323 | 30.59 | 0.527 |
| Cadmium Sulphate CdSO_4 | 0.030 | 0.0206 | 6.255 | 3.359 (N.) |
| " | 0.0787 | 0.0254 | 16.41 | 4.141 |
| " | 0.1574 | 0.0309 | 32.82 | 5.039 |
| Hydrochloric Acid HCl | 0.0283 | 0.00836 | 1.032 | 1.363 (N.) |
| " | 0.0560 | 0.00565 | 2.043 | 0.921 |
| " | 0.1468 | 0.00316 | 5.357 | 0.515 |
| Lithium Nitrate LiNO_3 | 0.5 | 0.02542 | 34.53 | 4.144 (G.) |
| " | 1.0 | 0.03035 | 69.07 | 4.960 |
| " | 2.0 | 0.03785 | 138.14 | 6.172 |
| " | 3.0 | 0.04438 | 207.21 | 7.236 |
| Potassium Chlorate KClO_3 | 0.5 | 0.0237 | 69.30 | 3.864 (G.) |
| Potassium Nitrate KNO_3 | 0.015 | 0.0170 | 1.669 | 2.771 (N.) |
| " | 0.030 | 0.0179 | 3.336 | 2.918 |
| " | 0.0787 | 0.0192 | 8.752 | 3.131 |
| " | 0.1574 | 0.0212 | 17.540 | 3.456 |
| " | 0.5 | 0.0257 | 50.59 | 4.183 (G.) |
| " | 1.0 | 0.0308 | 101.19 | 5.017 |
| " | 2.0 | 0.0390 | 202.38 | 6.365 |
| Sodium Acetate CH_3COOH | 0.015 | 0.0168 | 1.231 | 2.739 (N.) |
| " | 0.030 | 0.0172 | 2.462 | 2.804 |
| " | 0.0787 | 0.0185 | 6.46 | 3.016 |
| " | 0.1574 | 0.0196 | 12.92 | 3.196 |
| Sodium Nitrate NaNO_3 | 0.5 | 0.02564 | 42.54 | 4.180 (G.) |
| " | 1.0 | 0.03054 | 85.09 | 4.977 |
| " | 2.0 | 0.03851 | 170.18 | 6.279 |
| " | 3.0 | 0.04544 | 255.27 | 7.409 |
| " | 4.0 | 0.05128 | 340.36 | 8.361 |
| Sodium Chlorate NaClO_3 | 0.5 | 0.02320 | 53.25 | 3.783 (G.) |
| " | 1.0 | 0.02687 | 106.5 | 4.380 |
| " | 2.0 | 0.03060 | 213.0 | 4.989 |
| " | 3.0 | 0.03303 | 319.5 | 5.386 |
| " | 4.0 | 0.03850 | 426.0 | 6.277 |
| Tellurium Bromate TeBrO_3 (at 39.75°) | 0.01567 | 0.01959 | 4.005 | 3.194 (N. and A.) |
| Tellurium Nitrate TeNO_3 | 0.0283 | 0.0083 | 5.368 | 1.353 (N.) |
| " | 0.0560 | 0.00571 | 10.62 | 0.933 |
| " | 0.1468 | 0.00332 | 27.85 | 0.544 |
| Tellurium Sulphate Te_2SO_4 | 0.0283 | 0.00886 | 9.94 | 1.444 (N.) |
| " | 0.0560 | 0.00624 | 19.67 | 1.016 |
| Tellurium Sulphocyanide TeSCN | Sat. | 0.0119 | Sat. | 1.94 (N.) |
| " (at 39.75°) | 0.02149 | 0.01807 | 3.990 | 2.945 (N. and A.) |

TELLURIUM CHLORIDE 334

One liter of aq. solution contains 0.0161 g. mol. or 2.625 grams TeCl at 25°.

One liter of aq. solution contains 0.02523 g. mol. or 4.113 grams TeCl at 39.75°.

TELLURIUM SULPHOCYANIDE TeSCN.

SOLUBILITY IN WATER AND IN AQUEOUS SALT SOLUTIONS.

(Noyes; Noyes and Abbott.)

One liter aq. solution contains 0.0149 g. mol. or 2.767 grams TeSCN at 25°.

One liter aq. solution contains 0.02773 g. mol. or 5.15 grams TeSCN at 39.75°.

| Aq. Salt Solution. | t°. | Gm. Mols. per Liter. | | Grams per Liter. | |
|--------------------------------------|-------|----------------------|---------|------------------|-------------------|
| | | Salt. | TeSCN. | Salt. | TeSCN. |
| Tellurium Chloride TeCl | 25 | sat. | 0.0107 | sat. | 1.987 (N.) |
| Tellurium Bromate TeBrO ₃ | 39.75 | 0.01496 | 0.0221 | 3.823 | 4.104 (N. and A.) |
| Tellurium Nitrate TeNO ₃ | 25 | 0.0227 | 0.00852 | 4.305 | 1.582 (N.) |
| " | 25 | 0.0822 | 0.00406 | 15.59 | 0.754 |
| Potassium Sulphocyanide, KSCN | 25 | 0.0227 | 0.0083 | 2.208 | 1.541 (N.) |

TELLURIUM DOUBLE SULPHATES.

SOLUBILITY IN WATER AT 25°.

(Locke — Am. Ch. J. 27, 459, '01.)

| Double Sulphate. | Formula. | Salt per 100 cc. H ₂ O. | |
|--------------------|--|------------------------------------|------------|
| | | Gms. Anhydrous. | Gram Mols. |
| Te Copper Sulphate | Te ₂ Cu(SO ₄) ₂ .6H ₂ O | 8.1 | 0.0122 |
| Te Nickel Sulphate | Te ₂ Ni(SO ₄) ₂ .6H ₂ O | 4.61 | 0.007 |
| Te Zinc Sulphate | Te ₂ Zn(SO ₄) ₂ .6H ₂ O | 8.6 | 0.0129 |

THALLIUM BROMATE TlBrO₃.

One liter aq. solution contains 3.463 gms. TlBrO₃ at 19.96°, and 7.41 gms. at 39.75°.

(Böttger — Z. physik. Chem. 46, 602, '03; Noyes and Abbott — *Ibid.* 16, 132, '95.)

THALLIUM BROMIDE TlBr.

One liter aq. solution contains 0.42 gm. TlBr at 18°, 0.476 gm. at 20°, 0.57 gm. at 25°, and 2.467 gms. at 68.5°.

(Kohlrausch — Z. physik. Chem. 50, 356, '04; Noyes — *Ibid.* 6, 248, '90; Böttger.)

THALLIUM CARBONATE Tl₂CO₃.

SOLUBILITY IN WATER.

(Crookes; Lamy.)

| t° | 15.5° | 18° | 62° | 100° | 100.8° |
|--|----------|------|-------|-----------|--------|
| Gms. Tl ₂ CO ₃ per 100 gms. H ₂ O | 4.2 (C.) | 5.23 | 12.85 | 27.2 (C.) | 22.4 |

THALLIUM (Per) CHLORATE TlClO₄.

100 grams H₂O dissolve 10 gms. TlClO₄ at 15°, and 166.6 gms. at 100°.

(Roscoe — J. Chem. Soc. 19, 504, '66.)

THALLIUM CHLORATE TiClO_3 .

SOLUBILITY IN WATER.

(Muir — J. Chem. Soc. 29, 857, '76.)

| t° | 0° | 20° | 50° | 80° | 100° |
|---|-----------|------------|------------|------------|-------------|
| Gms. TiClO_3 per 100 gms. H_2O | 2.80 | 3.92 | 12.67 | 36.65 | 57.31 |

SOLUBILITY OF MIXED CRYSTALS OF THALLIUM CHLORATE AND POTASSIUM CHLORATE IN WATER AT 10° .

(Roozeboom — Z. physik. Chem. 8, 532, '91.)

NOTE. — Solutions of the two salts were mixed in different proportions and allowed to crystallize, such amounts being taken that not more than one or two grams would separate from one liter.

| Grams per 1000 cc. Solution. | | Mg. Mols. per 1000 cc. Solution. | | Sp. Gr. of Solutions. | Mol. per cent KClO_3 in Mixed Crystals. |
|------------------------------|-------------------|----------------------------------|-------------------|-----------------------|--|
| TiClO_3 . | KClO_3 . | TiClO_3 . | KClO_3 . | | |
| 25.637 | ... | 89.14 | ... | 1.0210 | 0 |
| 19.637 | 6.884 | 68.27 | 56.15 | 1.0222 | 2.0 |
| 12.001 | 26.100 | 41.73 | 212.89 | 1.0278 | 12.61 |
| 9.036 | 40.064 | 31.42 | 326.79 | 1.0338 | 25.01 |
| 7.885 | 46.497 | 27.42 | 379.26 | 1.0359 | 36.30-97.93 |
| 7.935 | 46.535 | 27.60 | 379.57 | 1.0360 | |
| 6.706 | 46.410 | 23.32 | 378.55 | 1.0357 | |
| 6.729 | 47.109 | 23.37 | 384.25 | 1.0363 | 99.28 |
| 4.858 | 47.312 | 16.89 | 385.91 | 1.0345 | 99.60 |
| 2.769 | 47.134 | 9.63 | 384.46 | 1.0330 | 99.62 |
| ... | 49.925 | ... | 407.22 | 1.0330 | 99.67 |
| | | | | | 100.00 |

SOLUBILITY OF MIXED CRYSTALS OF THALLIUM CHLORATE AND POTASSIUM CHLORATE IN WATER AT DIFFERENT TEMPERATURES.

(Quoted by Rabe — Z. anorg. Chem. 31, 156, '02.)

100 gms. H_2O dissolve 2.8 gms. TiClO_3 + 3.3 gms. KClO_3 at 0° .
 100 gms. H_2O dissolve 1.5 gms. TiClO_3 + 10.0 gms. KClO_3 at 15° .
 100 gms. H_2O dissolve 12.67 gms. TiClO_3 + 16.2 gms. KClO_3 at 50° .
 100 gms. H_2O dissolve 57.3 gms. TiClO_3 + 48.2 gms. KClO_3 at 100° .

THALLIUM CHLORIDE TiCl .

SOLUBILITY IN WATER.

(Average curve from results of Noyes — Z. physik. Chem. 9, 609, '02; Böttger — *Ibid.* 46, 602, '03; Kohlrausch — *Ibid.* 50, 350, '04; Heberling; Crookes; Lamy — The results of Berkeley — Trans. Roy. Soc. (Lond.) 203 A, 208, '04 are also given.)

| t° . | Gms. TiCl per Liter. | | t° . | Gms. TiCl per Liter. | | t° . | Gms. TiCl per Liter. | |
|-------------|-------------------------------|----------|-------------|-------------------------------|-----|-------------|-------------------------------|--------------|
| 0 | 2.1 (av.) | 1.7 (B.) | 25 | 3.86 | 4.0 | 60 | 8.0 | 10.2 |
| 10 | 2.5 | 2.4 | 30 | 4.2 | 4.6 | 80 | 12.0 | 16.0 |
| 20 | 3.3 | 3.4 | 40 | 5.2 | 6.0 | 100 | 18.0 | 24.1 (99.3°) |
| | | | 50 | 6.3 | 8.0 | | | |

SOLUBILITY OF THALLIUM CHLORIDE IN AQUEOUS SOLUTIONS OF SALTS AT 25°.

(Noyes — Z. physik. Chem. 9, 609, '92.)

| Aq. Salt Solution. | Gram. Equiv. per Liter. | | Grams. per Liter. | | Grams per Liter. | | | | |
|--------------------|-------------------------|---|-------------------|-------------------------|--------------------|----------|-------|-------------------|-------|
| | Salt. | TlCl. | Salt. | TlCl. | Salt. | TlCl. | | | |
| NH ₄ Cl | 0.0 | NH ₄ Cl or HCl | 0.01612 | 0.00 NH ₄ Cl | 3.861 | 0.00 HCl | 3.861 | | |
| and also | 0.025 | " | 0.00873 | 1.338 | " | 2.101 | 0.886 | " | 2.0 |
| HCl | 0.05 | " | 0.00589 | 2.676 | " | 1.421 | 1.772 | " | 1.402 |
| | 0.10 | " | 0.00384 | ... | " | ... | 3.545 | " | 0.920 |
| | 0.20 | " | 0.00262 | 10.704 | " | 0.649 | 7.090 | " | 0.608 |
| CuCl ₂ | 0.025 | CuCl ₂ or CaCl ₂ | 0.00902 | 3.36 | CuCl ₂ | 2.161 | 3.77 | CaCl ₂ | 2.161 |
| and also | 0.05 | " | 0.00619 | 6.72 | " | 1.483 | 7.55 | " | 1.483 |
| CaCl ₂ | 0.10 | " | 0.00419 | 13.45 | " | 1.003 | 15.11 | " | 1.003 |
| | 0.20 | " | 0.00287 | 26.90 | " | 0.688 | 30.22 | " | 0.687 |
| MgCl ₂ | 0.025 | MgCl ₂ or MnCl ₂ | 0.00901 | 2.381 | MgCl ₂ | 2.158 | 3.147 | MnCl ₂ | 2.158 |
| and also | 0.05 | " | 0.00618 | 4.763 | " | 1.480 | 6.295 | " | 1.480 |
| MnCl ₂ | 0.10 | " | 0.00412 | 9.526 | " | 0.987 | 12.59 | " | 0.987 |
| | 0.20 | " | 0.00278 | 19.052 | " | 0.666 | 25.18 | " | 0.666 |
| KCl | 0.025 | KCl or NaCl | 0.00871 | 1.86 | KCl | 2.086 | 1.46 | NaCl | 2.086 |
| and also | 0.05 | " | 0.00592 | 3.73 | " | 1.418 | 2.925 | " | 1.418 |
| NaCl | 0.10 | " | 0.00397 | 7.46 | " | 0.951 | 5.85 | " | 0.951 |
| | 0.20 | " | 0.00268 | 14.92 | " | 0.642 | 11.70 | " | 0.642 |
| TlClO ₃ | 0.025 | TlClO ₃ or TlNO ₃ | 0.00889 | 5.276 | TlClO ₃ | 2.129 | 4.74 | TlNO ₃ | 2.129 |
| and also | 0.05 | " | 0.00626 | ... | " | ... | 9.48 | " | 1.500 |
| TlNO ₃ | 0.10 | " | 0.00423 | ... | " | ... | 18.96 | " | 1.014 |
| ZnCl ₂ | 0.025 | ZnCl ₂ | 0.00899 | 3.41 | ZnCl ₂ | 2.153 | | | |
| | 0.05 | " | 0.00627 | 6.81 | " | 1.502 | | | |
| | 0.10 | " | 0.00412 | 13.63 | " | 0.987 | | | |
| | 0.20 | " | 0.00281 | 27.26 | " | 0.673 | | | |
| CdCl ₂ | 0.025 | CdCl ₂ | 0.0104 | 4.53 | CdCl ₂ | 2.491 | | | |
| | 0.05 | " | 0.0078 | 9.16 | " | 1.868 | | | |
| | 0.10 | " | 0.00578 | 18.33 | " | 1.385 | | | |
| | 0.20 | " | 0.00427 | 36.66 | " | 1.029 | | | |

One liter of water dissolves 2.7 gms. *thallo thallic chloride* 3TlCl.TlCl₃ at 15°-17°, and 35.0 grams at 100°.

(Crookes; Lamy; Hebbertling.)

THALLOUS CHROMATE Tl₂CrO₄.

100 gms. H₂O dissolve 0.03 gm. Tl₂CrO₄ at 60°, and 0.2 gm. at 100°.

(Browning and Hutchins — Z. anorg. Chem. 22, 380, '00.)

One liter of aq. 31 per cent KOH solution dissolves 18 grams Tl₂CrO₄.

(Lepierre and Lachand — Compt. rend. 113, 196, '91.)

One liter of H₂O dissolves 0.35 gram Thallous Tri Chromate Tl₂Cr₃O₁₀ at 15°, and 2.27 grams at 100°.

(Crookes.)

THALLOUS CYANIDE TlCN and Double Cyanides.

SOLUBILITY IN WATER.

(Frommüller — Ber. 11, 92, '78.)

| Cyanide. | Formula. | Gms. Salt per 100 Gms. H_2O . |
|--------------------|---|--|
| Tl Cyanide | TlCN | at 28.5° , 16.8 |
| Tl Cobalti Cyanide | $\text{Tl}_2\text{Co}(\text{CN})_6$ | at 0° , 3.6; at 9.5° , 5.86; at 19.5° , 10.04 |
| Tl Zinc Cyanide | $2\text{TlCN}.\text{Zn}(\text{CN})_2$ | at 0° , 8.7; at 14° , 15.2; at 31° , 29.6 |
| Tl Ferro Cyanide | $\text{Tl}_4\text{Fe}(\text{CN})_6.2\text{H}_2\text{O}$ | at 18° , 0.37 at 101° , 3.93. |

(Lamy.)

THALLOUS FLUORIDE TlF .100 gms. H_2O dissolve 80 gms. TlF at 15° .

(Buchner — Sitzb. K. Akad. Wiss. (Wein) 52, 2, 644, '65)

THALLIUM IODATE TlIO_3 .One liter aq. solution contains 0.578 gram TlIO_3 at 20° .

(Böttger — Z. physik. Chem. 46, 602, '03.)

THALLIUM IODIDE TlI .

SOLUBILITY IN WATER.

(Average results from Böttger; Kohlrausch; Werther; Crookes; Lamy; Hebbeling.)

| t° . | 0° . | 20° . | 40° . | 60° . | 80° . | 100° . |
|-----------------------------|-------------|--------------|--------------|--------------|--------------|---------------|
| Gms. TlI per liter | 0.02 | 0.06 | 0.15 | 0.35 | 0.70 | 1.20 |

One liter of $2\frac{1}{2}$ per cent aq. ammonia dissolves 0.761 gm. TlCl .One liter of $6\frac{1}{2}$ per cent aq. ammonia dissolves 0.758 gm. TlCl .One liter of 90 per cent alcohol dissolves 0.0038 gm. TlCl .One liter of 50 per cent alcohol dissolves 0.027 gm. TlCl .

(Long — J. Anal. Ch. 2, 243, '88.)

THALLIUM NITRATE TlNO_3 .

SOLUBILITY IN WATER.

(Berkeley — Trans. Roy. Soc. (Lond.) 203 A, 213, '04; see also Etard — Ann. chim. phys. [7] 2, 527, '94; Crookes; Lamy.)

| t° . | Gms. TlNO_3 per 100 Gms. | | t° . | Gms. TlNO_3 per 100 Gms. | |
|-------------|-----------------------------------|--------|-------------|-----------------------------------|--------|
| | Solution. | Water. | | Solution. | Water. |
| 0 | 3.76 | 3.91 | 60 | 31.55 | 46.2 |
| 10 | 5.86 | 6.22 | 70 | 41.01 | 69.5 |
| 20 | 8.72 | 9.55 | 80 | 52.6 | 111.0 |
| 30 | 12.51 | 14.3 | 90 | 66.66 | 200.0 |
| 40 | 17.33 | 20.9 | 100 | 80.54 | 414.0 |
| 50 | 23.33 | 30.4 | 105 | 85.59 | 594.0 |

Solid phase. TlNO_3 , rhombic.100 gms. H_2O dissolve 43.5 gms. TlNO_3 + 104.2 gms. KNO_3 at 58° .

(Rabe — Z. anorg. Chem. 31, 156, '02.)

THALLIUM OXALATE $\text{Tl}_2\text{C}_2\text{O}_4$.One liter of saturated aqueous solution contains 15.77 grams $\text{Tl}_2\text{C}_2\text{O}_4$ at 20° , and 18.69 gms. at 25° .

(Böttger — Z. physik. Chem. 46, 602, '03; Abegg and Spencer — Z. anorg. Chem. 46, 406, '05.)

SOLUBILITY OF THALLIUM OXALATE AT 25° IN Aq. SOLUTIONS OF:

| Thallium Nitrate. (Aberg and Spencer.) | | | | Potassium Oxalate. (A. and S.) | | | |
|---|---|---------------------|---|--|---|--|---|
| Mol. Concentration. | | Grams per Liter. | | Mol. Concentration. | | Grams per Liter. | |
| TlNO ₃ . | Tl ₂ C ₂ O ₄ . | TlNO ₃ . | Tl ₂ C ₂ O ₄ . | K ₂ C ₂ O ₄ . | Tl ₂ C ₂ O ₄ . | K ₂ C ₂ O ₄ . | Tl ₂ C ₂ O ₄ . |
| 0.0 | 0.03768 | 0.00 | 18.69 | 0.0498 | 0.0351 | 8.281 | 17.42 |
| 0.04114 | 0.0264 | 10.95 | 13.10 | 0.0996 | 0.03565 | 16.57 | 17.69 |
| 0.0799 | 0.0195 | 21.26 | 9.68 | 0.2467 | 0.0390 | 41.02 | 19.36 |
| 0.1597 | 0.01235 | 42.51 | 6.128 | 0.4886 | 0.04506 | 81.25 | 22.37 |
| | | | | 0.9785 | 0.05536 | 162.6 | 27.48 |

THALLOUS PHOSPHATE (ortho) Tl₃PO₄.

One liter of sat. aqueous solution contains 4.97 gms. Tl₃PO₄ at 15° and 6.71 gms. at 100°. (Crookes.)

THALLIUM PICRATE TlOC₆H₃(NO₂)₃.
SOLUBILITY IN WATER.
(Rabe — Z. phys. Chem. 38, 179, '01.)

| t°. | Gms. TlOC ₆ H ₃ (NO ₂) ₃ per 100 Gms. H ₂ O. | Solid Phase. | t°. | Gms. TlOC ₆ H ₃ (NO ₂) ₃ per 100 Gms. H ₂ O. | Solid Phase. |
|-----|--|----------------|-----|--|------------------|
| 0 | 0.135 | Monoclinic Red | 45 | 1.04 | Triclinic Yellow |
| 18 | 0.36 | " | 47 | 1.10 | " |
| 30 | 0.575 | " | 50 | 1.205 | " |
| 40 | 0.825 | " | 60 | 1.73 | " |
| 45 | 1.01 | " | 70 | 2.43 | " |
| 47 | 1.14 | " | | | " |

100 gms. H₂O dissolve 0.132 gm. C₆H₃(NO₂)₃OTl + 0.36 gram C₆H₄(NO₂)₃OK at 0°.

100 gms. H₂O dissolve 0.352 gm. C₆H₃(NO₂)₃OTl + 0.44 gram C₆H₄(NO₂)₃OK at 15°.

100 gms. H₂O dissolve 0.38 gm. C₆H₃(NO₂)₃OTl + 0.23 gram C₆H₄(NO₂)₃OK at 20°. (Rabe.)

THALLIUM SULPHATE Tl₂SO₄.
SOLUBILITY IN WATER.

(Berkeley — Trans. Roy. Soc. (Lond.) 203 A 211, '04; see also Crookes; Lamy.)

| t°. | Gms. Tl ₂ SO ₄ per 100 Gms. | | t°. | Gms. Tl ₂ SO ₄ per 100 Gms. | |
|-----|---|--------|------|---|--------|
| | Solution. | Water. | | Solution. | Water. |
| 0 | 2.63 | 2.70 | 60 | 9.89 | 10.92 |
| 10 | 3.57 | 3.70 | 70 | 11.31 | 12.74 |
| 20 | 4.64 | 4.87 | 80 | 12.77 | 14.61 |
| 30 | 5.80 | 6.16 | 90 | 14.19 | 16.53 |
| 50 | 8.44 | 9.21 | 99.7 | 15.57 | 18.45 |

100 gms. H₂O dissolve 4.74 gms. Tl₂SO₄ + 10.3 gms. K₂SO₄ at 15°.

100 gms. H₂O dissolve 11.5 gms. Tl₂SO₄ + 16.4 gms. K₂SO₄ at 62°.

100 gms. H₂O dissolve 18.52 gms. Tl₂SO₄ + 26.2 gms. K₂SO₄ at 100°. (Rabe — Z. anorg. Ch. 31, 156, '02.)

THALLIUM SULPHIDE Tl₂S

One liter of sat. aqueous solution contains 0.215 gm. Tl₂S at 20°.

(Böttger — Z. phys. Chem. 46, 602, '03.)

THALLIUM SULPHITE Tl_2SO_3 .

100 gms. H_2O dissolve 3.34 gms. Tl_2SO_3 at 15.5° .

(Seubert and Elken — Z. anorg. Chem. 2 434, '92.)

THALLIUM SULPHOCYANIDE TlSCN .

One liter of sat. aqueous solution contain 3.154 gms. TlSCN at 20° , 3.92 gms. at 25° and 7.32 gms. at 39.75° .

(Böttger; Noyes; Noyes and Abbott)

THALLIUM VANADATES.

SOLUBILITY IN WATER.

(Carnelly — J. Chem. Soc. [2] 11, 323, '73; Liebig's Ann. 116, 155, '60.)

| Vanadate. | Formula. | Gms. Vanadate per 100 Gms. H_2O . | |
|-------------------|---|---|------------------|
| | | At 15° . | At 100° . |
| Tl. meta Vanadate | TlVO_3 | 0.087 (11°) | 0.21 |
| " ortho Vanadate | Tl_3VO_3 | 1.0 | 1.74 |
| " pyro Vanadate | $\text{Tl}_4\text{V}_2\text{O}_7$ | 0.20 (14°) | 0.26 |
| " Vanadate | $\text{Tl}_{12}\text{V}_8\text{O}_{28}$ | 0.107 | 0.29 |

THEOBROMINE $\text{C}_7\text{H}_5(\text{CH}_3)_3\text{N}_4\text{O}_2$.

100 gms. carbon tetra chloride dissolve 0.0212 gm. at b. pt.

100 gms. ether dissolve 0.032 gm. at b. pt.

(Göckel — Chem. Centralb. ii, 401, '97.)

80 cc. H_2O containing 14.8 gms. tri sodium phosphate dissolve 3.5 gms. theobromine at 15° .

(Brisse-Moret — J. pharm. chim. [6] 7, 176, '98.)

THORIUM SELENATE $\text{Th}(\text{SeO}_4)_4 \cdot 9\text{H}_2\text{O}$.

100 gms. H_2O dissolve 0.498 gm. $\text{Th}(\text{SeO}_4)_4$ at 0° and 1.972 gms. at 100° .

(Cleve — Bull. Soc. chim. [2] 43, 166, '85.)

THORIUM SULPHATE $\text{Th}(\text{SO}_4)_2$.

SOLUBILITY IN WATER.

(Roozeboom — Z. physic. Chem. 5, 201, '90; Demarcay — Compt. rend. 96, 1860, '83.)

| t° . | Gms. $\text{Th}(\text{SO}_4)_2$ per 100 Gms. H_2O . | | Solid Phase. | t° . | Gms. $\text{Th}(\text{SO}_4)_2$ per 100 Gms. H_2O . | | Solid Phase. |
|-------------|---|-----------|--|-------------|---|--|--|
| 0 | 0.74 (R) | 0.88 (D) | $\text{Th}(\text{SO}_4)_2 \cdot 9\text{H}_2\text{O}$ | 0 | 1.50 (R) | | $\text{Th}(\text{SO}_4)_2 \cdot 6\text{H}_2\text{O}$ |
| 10 | 0.98 | 1.02 | " | 15 | 1.63 | | " |
| 20 | 1.38 | 1.25 | " | 30 | 2.45 | | " |
| 30 | 1.995 | 1.85 | " | 45 | 3.85 | | " |
| 40 | 2.998 | 2.83 | " | 60 | 6.64 | | " |
| 50 | 5.22 (51°) | 4.86 | " | 17 | 9.41 (D) | | $\text{Th}(\text{SO}_4)_2 \cdot 4\text{H}_2\text{O}$ |
| 55 | 6.76 | 6.5 \pm | " | 40 | 4.04 (R) 4.5 (35° D) | | " |
| 0 | 1.0 | | $\text{Th}(\text{SO}_4)_2 \cdot 8\text{H}_2\text{O}$ | 50 | 2.54 1.94 (55°) | | " |
| 15 | 1.38 | | " | 60 | 1.63 ... | | " |
| 25 | 1.85 | | " | 70 | 1.09 1.32 (75°) | | " |
| 44 | 3.71 | | " | 95 | ... 0.71 | | " |

TIN CHLORIDE (Stannous) SnCl_2 .

100 gms. H_2O dissolve 83.9 gms. SnCl_2 at 0° and 269.8 gms. at 15° , Sp. Gr. of Solutions 1.532 and 1.827 respectively.

(Engel — Ann. chim. phys. [6] 17, 347, '89; Michel and Krafft — *Ibid.* [3] 41, 478, '51.)

**SOLUBILITY OF STANNOUS CHLORIDE IN AQUEOUS SOLUTIONS OF
HYDROCHLORIC ACID AT 0° .**

(Engel.)

| Milligram Mols. per 10 cc. Solution. | | Sp. Gr. of Solution. | Grams per 100 cc Solution. | |
|---|----------------------------|----------------------------|-------------------------------|-----------------|
| HCl. | $\frac{1}{2}\text{SnCl}_2$ | | HCl. | SnCl_2 |
| 0 | 74.0 | 1.532 | 0.0 | 70.26 |
| 6.6 | 66.7 | 1.489 | 2.405 | 63.33 |
| 13.54 | 63.75 | 1.472 | 4.935 | 60.52 |
| 24.8 | 68.4 | 1.524 | 9.04 | 64.95 |
| 34.9 | 81.2 | 1.625 | 12.72 | 77.11 |
| 40.0 | 94.2 | 1.724 | 14.58 | 89.45 |
| 44.0 | 117.6 | 1.883 | 16.04 | 111.7 |
| 49.4 | 147.6 | 2.114 | 18.01 | 138.6 |
| 66.0 | 156.4 | 2.190 | 24.05 | 148.5 |
| 78.0 | 157.0 | 2.199 | 28.43 | 149.0 |

100 gms. acetone dissolve 55.6 gms. SnCl_2 at 18° .

(Naumann — Ber. 37, 4332, '04.)

100 gms. ether dissolve 11.4 gms. $\text{SnCl}_2 \cdot 2\text{H}_2\text{O}$ at 0° – 35.5° .

100 gms. ethyl acetate dissolve 31.2 gms. $\text{SnCl}_2 \cdot 2\text{H}_2\text{O}$ at -2° , 35.53° gms. at $+22^\circ$ and 73.44 gms. at 82° .

(von Laszcynski — Ber. 27, 2285, '94.)

TIN HYDROXIDE $\text{Sn}(\text{OH})_2$.

**SOLUBILITY IN AQUEOUS SODIUM HYDROXIDE SOLUTIONS. MOIST
TIN HYDROXIDE USED, ORDINARY TEMPERATURE.**

(Rubenbauer — Z. anorg. Chem. 30, 335, '02.)

| Gms. per 20 cc. Solution. | | Mol. Dilution of the NaOH . | Gms. per 20 cc. Solution. | | Mol. Dilution of the NaOH . |
|------------------------------|--------|--|------------------------------|--------|--|
| Na. | Sn. | | Na. | Sn. | |
| 0.2480 | 0.1904 | 1.86 | 0.8326 | 0.5560 | 0.55 |
| 0.3680 | 0.2614 | 1.25 | 0.9661 | 0.7849 | 0.48 |
| 0.6394 | 0.4304 | 0.72 | 2.1234 | 1.8934 | 0.23 |

TIN IODIDE (Stannous) SnI_2 .

SOLUBILITY IN WATER AND IN AQUEOUS HYDRIODIC ACID.

(Young — J. Am. Chem. Soc. 19, 851, '97.)

t° . Gms. SnI_2 per 100 Gms. Aqueous HI Solutions of:

| t° . | 0% H_2O . | 5.83%. | 9.60%. | 15.2%. | 20.44%. | 24.8%. | 30.4%. | 36.82%. |
|-------------|---------------------------|--------|--------|--------|---------|--------|--------|---------|
| 20 | 0.98 | 0.20 | 0.23 | 0.60 | 1.81 | 4.20 | 10.86 | 25.31 |
| 30 | 1.16 | 0.23 | 0.23 | 0.64 | 1.81 | 4.06 | 10.28 | 23.46 |
| 40 | 1.40 | 0.33 | 0.28 | 0.71 | 1.90 | 4.12 | 10.06 | 23.15 |
| 50 | 1.69 | 0.46 | 0.38 | 0.82 | 2.12 | 4.34 | 10.35 | 23.76 |
| 60 | 2.07 | 0.66 | 0.55 | 1.11 | 2.51 | 4.78 | 11.03 | 24.64 |
| 70 | 2.48 | 0.91 | 0.80 | 1.37 | 2.92 | 5.43 | 11.97 | 25.72 |
| 80 | 2.95 | 1.23 | 1.13 | 1.83 | 3.70 | 6.38 | 13.30 | 27.23 |
| 90 | 3.46 | 1.65 | 1.52 | 2.40 | 4.58 | 7.82 | 15.52 | 29.84 |
| 100 | 4.03 | 2.23 | 2.04 | 3.63 | 5.82 | 9.60 | ... | 34.05 |

TIN IODIDE (Stannic) SnI_4 .

SOLUBILITY IN CARBON BISULPHIDE.

(Sneider — Pogg. Ann. 127, 624, '66; Arctowski — Z. anorg. Chem. 11, 274, '95.)

| t°. | -114° | -94° | -80° | -84° | -58° | ord. temp. |
|---|-------|-------|------|-------|-------|------------|
| Gms. SnI_4 per 100 gms. Solution | 9.41 | 10.65 | 9.68 | 10.22 | 16.27 | 59.2(S.) |

100 gms. methylene iodide, CH_2I_2 , dissolve 22.9 gms. SnI_4 at 10°.
 Sp. Gr. of Solution 3.481.

(Retgers — Z. anorg. Chem. 3, 343, '93.)

TIN SULPHATE (Stannous) SnSO_4 .

100 gms. H_2O dissolve 18.8 gms. SnSO_4 at 19° and 18.1 gms. at 100°.
 (Marignac.)

TOLUENE $\text{C}_6\text{H}_5\text{CH}_3$.

SOLUBILITY IN SULPHUR.

Figures read from curve, synthetic method used, see Note, page 9.

(Alexejew — Ann. Physik. Ch. 28, 305, '86.)

| t°. | Gms. $\text{C}_6\text{H}_5\text{CH}_3$ per 100 Gms. | | t°. | Gms. $\text{C}_6\text{H}_5\text{CH}_3$ per 100 Gms. | |
|-----|---|----------------|-----------------|---|----------------|
| | S Layer. | Toluene Layer. | | S Layer. | Toluene Layer. |
| 100 | 3 | 73 | 150 | 12.5 | 59 |
| 110 | 4 | 71 | 160 | 16 | 53 |
| 120 | 5 | 68 | 170 | 22 | 47 |
| 130 | 7 | 66 | 175 | 25 | 43 |
| 140 | 9.5 | 63 | 178 crit. temp. | 34 | |

TOLUYL ACIDS (Methyl Benzoic Acids) $\text{CH}_3\text{C}_6\text{H}_4\text{COOH}$.

SOLUBILITY IN WATER AT 25°.

(Paul — Z. physik. Chem. 14, 111, '94.)

| Acid. | $\text{CH}_3\text{C}_6\text{H}_4\text{COOH}$ per Liter Solution. | |
|------------------|--|------------|
| | Grams. | Millimols. |
| Meta Toluy Acid | 0.9801 | 7.207 |
| Ortho Toluy Acid | 1.1816 | 8.683 |
| Para Toluy Acid | 0.3454 | 2.540 |

TOLUIDIN $\text{C}_6\text{H}_4\text{CH}_3\text{NH}_2$.

SOLUBILITY IN WATER.

(Vaubel — J. pr. Chem. [2] 52, 72, '95; Lowenherz — Z. physik. Chem. 25, 410, '98.)

| t°. | Gms. $\text{C}_6\text{H}_4\text{CH}_3\text{NH}_2$ per 1000 Gms. H_2O . | | Solid Phase. | t°. | Gms. $\text{C}_6\text{H}_4\text{CH}_3\text{NH}_2$ per 1000 Gms. H_2O . | | Solid Phase. |
|-----|--|--|-----------------|------|--|--|--------------|
| | | | | | | | |
| 20 | 16.26 | | Liquid ortho T. | 20.8 | 7.39 | | Para T. |
| 20 | 0.15 | | Ortho T. | 26.7 | 9.50 | | " |
| 20 | 6.54 | | Para T. | 31.7 | 11.42 | | " |

SOLUBILITY OF PARA TOLUIDIN IN ETHYL ALCOHOL.

(Interpolated from original results of Speyers — Am. J. Sci. [4] 14, 295, '02.)

| t°. | Wt. of 1 cc. Solution. | Mols. per 100 Mols. C ₂ H ₅ OH. | Gms. per 100 Gms. C ₂ H ₅ OH. | t°. | Wt. of 1 cc. Solution. | Mols. per 100 Mols. C ₂ H ₅ OH. | Gms. per 100 Gms. C ₂ H ₅ OH. |
|-----|------------------------|---|---|-----|------------------------|---|---|
| 0 | 0.8885 | 20.72 | 48.1 | 20 | 0.9265 | 47.0 | 110.0 |
| 5 | 0.8982 | 26.0 | 60.0 | 25 | 0.9360 | 56.0 | 132.0 |
| 10 | 0.9080 | 32.0 | 74.0 | 30 | 0.9460 | 66.0 | 156.0 |
| 15 | 0.9180 | 38.6 | 90.0 | | | | |

Distribution of para Toluidin between water and carbon tetra chloride.

(Vaubel — J. pr. Chem. [2] 67, 478, '03.)

| Gms. ϕ Toluidin Used. | Volumes of Solvents. | Gms. C ₆ H ₄ (CH ₃)NH ₂ ϕ in: | |
|----------------------------|---|---|-------------------------|
| | | H ₂ O Layer. | CCl ₄ Layer. |
| 1.0 | 200 cc. H ₂ O + 100 cc. CCl ₄ | 0.1406 | 0.8594 |
| 1.0 | 200 cc. H ₂ O + 200 cc. CCl ₄ | 0.0666 | 0.9334 |

URANYL CHLORIDE UO₂Cl₂·3H₂O.100 gms. H₂O dissolve 320 gms. UO₂Cl₂ at 18°.

(Mylus and Dietz — Ber. 34, 2774, '01.)

URANYL DOUBLE CHLORIDES.

SOLUBILITY OF URANYL AMMONIUM CHLORIDE, U. TETRA METHYL AMMONIUM CHLORIDE, U. TETRA ETHYL AMMONIUM CHLORIDE, U. CAESIUM CHLORIDE, U. RUBIDIUM CHLORIDE, AND U. POTASSIUM CHLORIDE IN WATER.

(Rimbach — Ber. 37, 463, '04.)

| Formula of Double Salt. | t°. | Gms. per 100 Gms. Sat. Solution. | Atomic Relation in Sol. | Solid Phase. |
|---|-------|--|---|---|
| UO ₂ Cl ₂ ·2NH ₄ Cl·2H ₂ O | 15 | 40.67UO ₂ + 3.51NH ₄ + 19.15Cl | 1UO ₂ : 1.59NH ₄ : 3.59Cl | 1 Mol. double salt |
| UO ₂ Cl ₂ ·2N(CH ₃) ₄ Cl | 20.8 | 19.85 " + 10.44Cl ₂ = 41.24 * | 1UO ₂ : 4.02Cl | +0.4 Mol. NH ₄ Cl |
| | 80.7 | 20.23 " + 10.52Cl ₂ = 40.91 * | 1UO ₂ : 3.98Cl | Double salt |
| UO ₂ Cl ₂ ·2N(C ₂ H ₅) ₄ Cl | 27.1 | 15.02 " + 7.81Cl ₂ = 37.15 † | 1UO ₂ : 3.97Cl | " |
| | 80.7 | 15.12 " + 7.78Cl ₂ = 37.23 † | 1UO ₂ : 3.94Cl | " |
| UO ₂ Cl ₂ ·2CsCl | 29.75 | 22.11 " + 22.5 Cs = 56.04 ‡ | 1UO ₂ : 2.07Cs | " |
| UO ₂ Cl ₂ ·2RbCl·2H ₂ O | 24.8 | 27.18 " + 16.6 Rb = 13.8Cl § | 1UO ₂ : 1.96Rb: 3.90Cl | " |
| | 80.3 | 30.66 " + 19.1 Rb = 15.8Cl | 1UO ₂ : 1.98Rb: 3.95Cl | " |
| UO ₂ Cl ₂ ·2KCl·2H ₂ O | 0.8 | 38.57 " + 13.59Cl = 3.86K | 1UO ₂ : 2.69Cl: 0.69K | The double salt is decomposed by water at temperatures below 60°. |
| " | 14.9 | 33.71 " + 13.51Cl = ... K | 1UO ₂ : 3.06Cl: 1.06K | |
| " | 17.5 | 37.36 " + 14.50Cl = 5.27K | 1UO ₂ : 2.96Cl: 0.96K | |
| " | 25.0 | 35.01 " + 15.26Cl = ... K | 1UO ₂ : 3.33Cl: 1.33K | |
| " | 41.5 | 35.27 " + 15.92Cl = 7.39K | 1UO ₂ : 3.44Cl: 1.44K | |
| " | 50 | 34.18 " + 16.56Cl = ... K | 1UO ₂ : 3.71Cl: 1.71K | |
| " | 60 | 34.19 " + 17.25Cl = 9.14K | 1UO ₂ : 3.85Cl: 1.85K | |
| " | 71.5 | 33.55 " + 17.44Cl = 9.28K | 1UO ₂ : 3.06Cl: 1.06K | Double salt |
| " | 78.5 | 35.26 " + 18.24Cl = 9.95K | 1UO ₂ : 3.95Cl: 1.95K | " |

* UO₂Cl₂·2N(CH₃)₄Cl, † UO₂Cl₂·N(C₂H₅)₄Cl, ‡ UO₂Cl₂·2CsCl,
§ = 57.9 gms. UO₂Cl₂·2RbCl, || = 65.8 gms. UO₂Cl₂·2RbCl.

**URANYL SODIUM
CHROMATE****URANYL SODIUM CHROMATE** $2(\text{UO}_2)\text{CrO}_4 \cdot \text{Na}_2\text{CrO}_4 \cdot 10\text{H}_2\text{O}$.100 gms. sat. aqueous solution contains 52.52 gms. $(2\text{UO}_2)\text{CrO}_4 \cdot \text{Na}_2\text{CrO}_4$ at 20° . (Rimbach.)**URANYL POTASSIUM BUTYRATE** $\text{UO}_2(\text{C}_4\text{H}_7\text{O}_2)_2 \cdot \text{KC}_4\text{H}_7\text{O}_2$.The double salt is decomposed by water at ordinary temperatures and the solution gets richer in uranyl butyrate. The solubility at 29.4° in water containing $\text{KC}_4\text{H}_7\text{O}_2$ is 2.10 gms. $\text{UO}_2(\text{C}_4\text{H}_7\text{O}_2)_2 + 0.38$ gms. $\text{KC}_4\text{H}_7\text{O}_2$ per 100 gms. solution. The atomic relation being 1 : 0.64. (Rimbach.)**URANYL NITRATE** $\text{UO}_2(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}$.**SOLUBILITY IN WATER, ETC.**

(Bucholz; de Coninck — Compt. rend. 130, 1304, '00.)

100 gms. cold water dissolve 200 gms. $\text{UO}_2(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}$.100 gms. abs. alcohol dissolve 333 gms. $\text{UO}_2(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}$.100 gms. 85% alcohol dissolve 3.3 gms. $\text{UO}_2(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}$ at 12° (de C.)100 gms. ether dissolve 25 gms. $\text{UO}_2(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}$.100 gms. abs. acetone dissolve 1.5 gms. $\text{UO}_2(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}$ at 12° (de C.)

For densities of Uranium nitrate solutions in water and other solvents see de Coninck — Compt. rend. 131, 1219, '00.)

URANYL DOUBLE NITRATES.**SOLUBILITY OF URANYL AMMONIUM NITRATE, U. CAESIUM
NITRATE, U. POTASSIUM NITRATE, AND U. RUBIDIUM
NITRATE IN WATER.**

(Rimbach.)

| Formula of Salt. | t° . | Gms. per 100 Gms. Sat. Solution. | | Atomic Relation in Solution. |
|---|-------------|----------------------------------|----------------------------------|---|
| | | UO_2 . | Total Salt. | |
| $\text{UO}_2(\text{NO}_3)_2 \cdot \text{NH}_4\text{NO}_3$ | 0.5 | 29.71 + | 2.92 $\text{NH}_4 =$. . . | 1 UO_2 : 1.47 NH_4 : 3.47 NO_3 |
| " | 24.9 | 36.46 + | 3.54 " = 68.95 | " : 1.46 " : 3.46 " |
| " | 59.0 | 44.37 + | 2.90 " = . . . | " : 0.98 " : 2.98 " |
| " | 80.7 | 44.95 + | 2.98 " = 78.95 | " : 1.00 " : 3.00 " |
| $\text{UO}_2(\text{NO}_3)_2 \cdot \text{CsNO}_3$ | 16.0 | 31.39 + | 6.59 $\text{Cs} = 55.4$ | " : 0.44 Cs |
| $\text{UO}_2(\text{NO}_3)_2 \cdot \text{KNO}_3$ | 0.5 | 31.98 + | 1.72 $\text{K} =$. . . | " : 2.37 NO_3 : 0.37 K |
| " | 13.0 | 33.40 + | 2.72 " = . . . | " : 2.57 " : 0.57 " |
| " | 25.0 | 37.07 + | 4.01 " = 64.82 | " : 1.60 " : 0.76 " |
| " | 45.0 | 42.18 + | 5.16 " = . . . | " : 2.84 " : 0.84 " |
| " | 59.0 | 41.65 + | 6.03 " = . . . | " : 3.00 " : 1.00 " |
| " | 80.6 | 43.71 + | 6.38 " = . . . | " : 3.01 " : 1.01 " |
| $\text{UO}_2(\text{NO}_3)_2 \cdot \text{RbNO}_3$ | 25.0 | 35.41 + | 4.65 $\text{Rb} \dagger = 59.60$ | " : 1.40 " : 0.45 Rb |
| " | 80.0 | 34.66 + | 11.01 " = 69.49 | " : 3.00 " : 1.01 " |

* + 23.5 NO_3 . \dagger + 19.74 NO_3 .**URANYL AMMONIUM PROPIONATE** $2\text{UO}_2(\text{C}_3\text{H}_5\text{O}_2)_2 \cdot \text{NH}_4\text{C}_3\text{H}_5\text{O}_2 \cdot 2\text{H}_2\text{O}$ and Uranyl Potassium Propionate $2\text{UO}_2(\text{C}_3\text{H}_5\text{O}_2)_2 \cdot \text{KC}_3\text{H}_5\text{O}_2$.

(Rimbach.)

100 gms. aq. solution contain 16.48 gms. $2\text{UO}_2(\text{C}_3\text{H}_5\text{O}_2)_2 \cdot \text{NH}_4\text{C}_3\text{H}_5\text{O}_2$ at 29.8° .100 gms. aq. solution contain 2.362 gms. $\text{UO}_2(\text{C}_3\text{H}_5\text{O}_2)_2 + 0.82$ gm. $\text{KC}_3\text{H}_5\text{O}_2$ at 29.4° , atomic relation, 1 : 1.29.

URANYL SULPHATE $(\text{UO})_2\text{SO}_4 \cdot 3\text{H}_2\text{O}$.

SOLUBILITY IN WATER, ETC.

(Bucholz; de Coninck — Bull. Acad. Roy. Belgique, 350, '01.)

100 gms. H_2O dissolve 16.6 gms. $\text{UO}_2(\text{SO}_4) \cdot 3\text{H}_2\text{O}$ at 13.2° , 17.4 gms. at 15.5° , and 22.2 gms. at b. pt.100 gms. abs. alcohol dissolve 4.0 gms. $\text{UO}_2(\text{SO}_4) \cdot 3\text{H}_2\text{O}$ at 18.2° and 5.0 gms. at b. pt.100 gms. 85% alcohol dissolve 2.6 gms. $\text{UO}_2(\text{SO}_4) \cdot 3\text{H}_2\text{O}$ at 16° .100 gms. 16.2% alcohol dissolve 12.3 gms. $\text{UO}_2(\text{SO}_4) \cdot 3\text{H}_2\text{O}$ at 10° .**URANYL POTASSIUM SULPHATE** $\text{UO}_2\text{SO}_4 \cdot \text{K}_2\text{SO}_4 \cdot 2\text{H}_2\text{O}$ 100 gms. sat. aq. solution contain 10.41 gms. $\text{UO}_2\text{SO}_4 \cdot \text{K}_2\text{SO}_4$ at 25° and 23.13 gms. at 70.5° .
(Rimbach.)SOLUBILITY OF $\text{UO}_2\text{SO}_4 \cdot 2\text{K}_2\text{SO}_4 \cdot 2\text{H}_2\text{O} + \text{UO}_2\text{SO}_4 \cdot \text{K}_2\text{SO}_4 \cdot 2\text{H}_2\text{O}$ IN WATER.

| t°. | Gms. per 100 Gms. Solution. | | | Atomic Relation in Sol. | | | Mol. % in Solid Phase. | |
|-----|-----------------------------|------|-----------------|-------------------------|-----------|-----------------|------------------------|----------|
| | UO_2 . | K. | SO_4 . | UO_2 . | K. | SO_4 . | Mono Salt. | Di Salt. |
| 14 | 0.85 | 4.19 | 5.71 | 1 : 35.75 | 1 : 18.88 | | 29 | 71 |
| 50 | 6.70 | 8.15 | 12.37 | 1 : 5.20 | 1 : 8.40 | | 76 | 24 |
| 80 | 14.29 | 8.54 | 15.53 | 1 : 4.13 | 1 : 3.06 | | 12 | 88 |

UREA $\text{CO}(\text{NH}_2)_2$.

SOLUBILITY IN WATER AND IN ALCOHOLS.

(Campetti — Abstract, Z. phys. Chem. 41, 109, '02; Speyers — Am. J. Sci. [4] 14, 259, '02.)

NOTE. — Speyer's original results are in terms of Mols. $\text{CO}(\text{NH}_2)_2$ per 100 Mols. H_2O at irregular temperatures.

| t°. | In Water. | | | In Methyl Alcohol. | | | In Ethyl Alcohol. | |
|-----|------------------------|---|-----------|------------------------|---|-----------|------------------------|--|
| | Wt. of 1 cc. Solution. | Gms. $\text{CO}(\text{NH}_2)_2$ per 100 Gms. H_2O . | | Wt. of 1 cc. Solution. | Gms. $\text{CO}(\text{NH}_2)_2$ per 100 Gms. CH_3OH . | Solution. | Wt. of 1 cc. Solution. | Gms. $\text{CO}(\text{NH}_2)_2$ per 100 Gms. $\text{C}_2\text{H}_5\text{OH}$. |
| 0 | 1.121 | 55.9 | ... | 0.861 | 13.8 | 0.8213 | | 2.5 |
| 10 | 1.134 | 66.0 | 85.0 (C) | 0.863 | 16.0 | 0.814 | | 3.5 |
| 20 | 1.146 | 79.0 | 108.2 (C) | 0.869 | 20.0 | 0.809 | | 5.0 |
| 30 | 1.156 | 93.0 | ... | 0.876 | 24.0 | 0.806 | | 6.5 |
| 40 | 1.165 | 106.0 | ... | 0.890 | 30.0 | 0.804 | | 8.5 |
| 50 | 1.173 | 120.0 | ... | 0.908 | 37.0 | 0.803 | | 10.5 |
| 60 | 1.180 | 132.0 | ... | 0.928 | 47.0 | ... | | 13.0 |
| 70 | 1.187 | 145.0 | ... | ... | ... | ... | | 17.5 |

100 gms. abs. methyl alcohol dissolve 21.8 gms. $\text{CO}(\text{NH}_2)_2$ at 19.5° .100 gms. abs. ethyl alcohol dissolve 5.06 gms. $\text{CO}(\text{NH}_2)_2$ at 19.5° .

(de Bruyn — Z. phys. Chem. 10, 784, '02.)

100 gms. glycerine dissolve 50 gms. urea at 15.5° .Phenyl Thio **UREA** (Phenyl thio carbamide) $\text{CS.NH}_2.\text{NHC}_6\text{H}_5$.

SOLUBILITY IN WATER.

(Rothmund — Z. phys. Ch. 33, 406, '00; Biltz — *Ibid.* 43, 42, '03; Holeman and Antusch — Rec. trav. chim. 13, 290, '04; Bogdan — Ann. Scien. L'Univ. Jassy 2, 43, '02, '03.)One liter aq. solution contains 2.12 gms. $\text{CS}(\text{NH}_2).\text{NHC}_6\text{H}_5$ at 20° (B.), (R.) and 2.4 gms. at 25° . (H. and A.). Bogdan gives 2.547 gms. at 25° .

SOLUBILITY OF PHENYL THIO UREA IN AQUEOUS SALT SOLUTIONS AT 20°.

(Biltz; Rothmund.)

Millimols and also Gms. $\text{CS}(\text{NH}_2)\text{NHC}_6\text{H}_5$ Dissolved per Liter of Aqueous Salt Solution of Concentration:

| Salt Solution. | 0.125 Normal | | 0.25 Normal | | 0.5 Normal | | 1.0 Normal | |
|---|--------------|------|-------------|------|------------|------|------------|------|
| | Millimols. | Gms. | Millimols. | Gms. | Millimols. | Gms. | Millimols. | Gms. |
| $\frac{1}{2}\text{AlCl}_3$ | 12.95 | 1.97 | 12.82 | 1.96 | 12.03 | 1.83 | 10.69 | 1.61 |
| NH_4NO_3 | 14.17 | 2.15 | 14.4 | 2.21 | 14.53 | 2.22 | 14.91 | 2.27 |
| $\frac{1}{2}(\text{NH}_4)_2\text{SO}_4$ | 13.51 | 2.05 | 12.84 | 1.96 | 11.78 | 1.79 | 9.98 | 1.52 |
| $\frac{1}{2}\text{BaCl}_2$ | 13.12 | 1.99 | 12.92 | 1.97 | 12.22 | 1.86 | 10.44 | 1.59 |
| $\frac{1}{2}\text{Ba}(\text{NO}_3)_2$ | 13.98 | 2.13 | 13.98 | 2.13 | 13.90 | 2.12 | ... | ... |
| CsNO_3 | 14.53 | 2.21 | 14.90 | 2.27 | 15.23 | 2.33 | ... | ... |
| LiNO_3 | 13.96 | 2.13 | 13.96 | 2.13 | 13.93 | 2.12 | 13.73 | 2.10 |
| $\frac{1}{2}\text{MgSO}_4$ | 13.40 | 2.04 | 12.78 | 1.95 | 11.54 | 1.75 | 9.43 | 1.43 |
| $\text{KC}_2\text{H}_3\text{O}_2$ | 13.40 | 2.04 | 12.95 | 1.97 | 12.14 | 1.85 | 10.74 | 1.62 |
| KBr | 13.50 | 2.05 | 13.35 | 2.04 | 12.80 | 1.95 | 11.76 | 1.79 |
| KClO_3 | 13.86 | 2.11 | 13.60 | 2.06 | 13.12 | 1.99 | ... | ... |
| KCl | 13.40 | 2.04 | 12.73 | 1.94 | 12.19 | 1.85 | 10.54 | 1.60 |
| KI | 14.12 | 2.15 | 14.48 | 2.21 | 14.31 | 2.18 | 14.60 | 2.23 |
| KNO_3 | 13.89 | 2.12 | 13.85 | 2.11 | 13.52 | 2.05 | 12.82 | 1.96 |
| KNO_2 | 14.52 | 2.21 | 14.65 | 2.23 | 13.80 | 2.11 | 12.51 | 1.92 |
| $\frac{1}{2}\text{K}_2\text{SO}_4$ | 13.25 | 2.03 | 12.49 | 1.91 | 11.11 | 1.69 | 8.73 | 1.33 |
| RbNO_3 | 14.22 | 2.16 | 14.44 | 2.19 | 14.39 | 2.18 | 14.22 | 2.17 |
| $\frac{1}{2}\text{Na}_2\text{CO}_3$ | 13.29 | 2.04 | 12.52 | 1.91 | 11.05 | 1.68 | 8.58 | 1.32 |
| NaClO_3 | 13.75 | 2.09 | 13.65 | 2.08 | 13.07 | 1.98 | 12.21 | 1.86 |
| NaClO_4 | 14.15 | 2.15 | 14.05 | 2.14 | 13.58 | 2.06 | 12.56 | 1.92 |
| NaCl | 13.28 | 2.02 | 12.83 | 1.95 | 11.90 | 1.81 | 10.02 | 1.52 |
| NaI | 13.98 | 2.13 | 14.07 | 2.14 | 14.29 | 2.18 | 13.96 | 2.13 |
| NaNO_3 | 13.94 | 2.12 | 13.77 | 2.10 | 13.32 | 2.04 | 12.57 | 1.92 |
| NaNO_2 | 14.34 | 2.18 | 13.82 | 2.11 | 13.06 | 1.98 | 11.52 | 1.75 |
| $\frac{1}{2}\text{Na}_2\text{SO}_4$ | 13.19 | 2.00 | 12.35 | 1.87 | 10.85 | 1.63 | 8.30 | 1.27 |

SOLUBILITY OF PHENYL THIO UREA AT 25° IN AQUEOUS SOLUTIONS OF.

Potassium Nitrate.

(Bogdan.)

| Gms. Mols. KNO_3 per 1000 Gms. H_2O . | Gms. per 1000 Gms. H_2O . | |
|---|--|--|
| | KNO_3 . | $\text{CS}(\text{NH}_2)\text{NHC}_6\text{H}_5$. |
| 1.045 | 105.7 | 2.38 |
| 0.5123 | 51.84 | 2.48 |
| 0.2026 | 20.50 | 2.54 |
| 0.1007 | 10.19 | 2.56 |
| 0.0503 | 5.09 | 2.55 |
| 0.0333 | 3.36 | 2.55 |

Sodium Nitrate.

(Bogdan.)

| Gms. Mols. NaNO_3 per 1000 Gms. H_2O . | Gms. per 1000 Gms. H_2O . | |
|--|--|--|
| | NaNO_3 . | $\text{CS}(\text{NH}_2)\text{NHC}_6\text{H}_5$. |
| 1.024 | 87.14 | 2.26 |
| 0.5065 | 43.10 | 2.46 |
| 0.2031 | 17.28 | 2.51 |
| 0.0986 | 8.39 | 2.53 |
| 0.0540 | 4.59 | 2.54 |
| 0.0335 | 2.84 | 2.54 |

**SOLUBILITY OF PHENYL THIO UREA IN MIXTURES OF ETHYL
ALCOHOL AND WATER AT 25°.**

(Holleman and Antusch — *Rec. trav. chim.* 13, 290, '04.)

| Vol. per cent Alcohol. | Gms. CS(NH ₃) NH ₄ CaH ₂ per 100 Gms. Solvent. | Sp. Gr. of Solutions. | Vol. per cent Alcohol. | Gms. CS(NH ₃) NH ₄ CaH ₂ per 100 Gms. Solvent. | Sp. Gr. of Solutions. |
|------------------------|--|-----------------------|------------------------|--|-----------------------|
| 100 | 3.59 | ... | 65 | 3.40 | 0.9018 |
| 95 | 4.44 | 0.8200 | 60 | 2.80 | 0.9128 |
| 90 | 4.60 | 0.8389 | 50 | 1.87 | 0.9317 |
| 85 | 4.99 | 0.8544 | 40 | 1.13 | 0.9486 |
| 80 | 4.70 | 0.8679 | 25 | 0.56 | 0.9679 |
| 75 | 4.45 | 0.8810 | 15 | 0.38 | 0.9788 |
| 70 | 3.92 | 0.8915 | 0 | 0.24 | 0.9979 |

**SOLUBILITY OF PHENYL THIO UREA IN AQUEOUS SOLUTIONS OF
PROPYL AND OF ETHYL ALCOHOL AT 25°.**

(Bagdan.)

In Propyl Alcohol.

In Ethyl Alcohol.

| G. Mols. C_2H_5OH per 1000 Gms. H_2O . | Gms. per 1000 C_2H_5OH . | Gms. H_2O $CS(NH_2)_2$ $NH_4C_2H_5$. | G. Mols. C_2H_5OH per 1000 Gms. H_2O . | Gms. per 1000 C_2H_5OH . | Gms. H_2O $CS(NH_2)_2$ $NH_4C_2H_5$. |
|---|-------------------------------|---|---|-------------------------------|---|
| I. 035 | 62.10 | 3.587 | I. 1010 | 49.60 | 3.193 |
| 0.5448 | 32.688 | 3.124 | 0.5355 | 24.12 | 2.931 |
| 0.1059 | 6.354 | 2.643 | 0.1094 | 4.932 | 2.629 |
| 0.05526 | 3.316 | 2.599 | 0.05018 | 2.26 | 2.589 |
| 0.04854 | 2.912 | 2.586 | 0.03271 | 1.473 | 2.577 |

In Propyl Alcohol at 0°.

| | | |
|-------|-------|-------|
| 1.000 | 60.06 | 1.21 |
| 0.100 | 6.01 | 1.047 |

SOLUBILITY OF PHENYL THIO UREA IN AQUEOUS SOLUTIONS OF ACETONE, MANNITE, CANE SUGAR, DEXTROSE, AND UREA.

(Bagdan.)

| Aqueous Non Electro- lyte. | t°. | Gms. per 1000 Gms. H ₂ O | | Aqueous Non Electro- lyte. | t°. | Gms. per 1000 Gms. H ₂ O. | |
|---|-----|--|---|---|-----|---|--|
| | | Non Elec- trolyte. | CS(NH ₂) ₂ NH ₄ CaH ₅ . | | | Non Elec- trolyte. | CS(NH ₂) ₂ NHC ₆ H ₅ . |
| (CH ₃) ₂ CO | 25 | 7.478 | 2.667 | C ₆ H ₁₂ O ₈ | 25 | 180.40 | 3.042 |
| " | " | 2.513 | 2.579 | " | " | 90.46 | 2.83 |
| " | " | 1.908 | 2.573 | " | " | 29.29 | 2.69 |
| C ₆ H ₅ (OH) ₆ | " | 182.11 | 3.04 | " | " | 18.01 | 2.654 |
| " | " | 91.05 | 2.78 | " | " | 9.554 | 2.603 |
| C ₁₂ H ₂₂ O ₁₁ | 25 | 338.6 | 3.457 | CO(NH ₂) ₂ | " | 63.08 | 3.306 |
| " | " | 170.4 | 3.015 | " | " | 29.93 | 2.892 |
| " | " | 34.36 | 2.634 | " | " | 6.132 | 2.618 |
| " | " | 18.28 | 2.596 | " | " | 4.942 | 2.605 |
| " | " | 10.09 | 2.572 | " | " | 2.009 | 2.572 |
| " | 0 | 342.18 | 1.420 | " | 0 | 60.11 | 1.310 |
| " | " | 34.22 | 1.044 | " | " | 6.01 | 1.048 |

URETHANE $\text{CO}(\text{NH}_2)\text{OC}_2\text{H}_5$. SOLUBILITY IN SEVERAL SOLVENTS.

(Speyers Am. J. Sci. [4] 14, 294, '02.)

Interpolated and calculated from the original results which are given in terms of molecules Urethane per 100 Mols. solvent.

| Solubility in Water. | | | | Solubility in Methyl Alcohol. | | | |
|----------------------|-----------------------------------|---|---|-----------------------------------|---|---|--|
| t°. | Wt. of 1 cc. Solu- tion. | Mols. $\text{CO}(\text{NH}_2)$ OC_2H_5 per 100 Mols. H_2O . | Gms. $\text{CO}(\text{NH}_2)$ OC_2H_5 per 100 Gms. H_2O . | Wt. of 1 cc. Solu- tion. | Mols. $\text{CO}(\text{NH}_2)$ OC_2H_5 per 100 Mols. CH_3OH . | Gms. $\text{CO}(\text{NH}_2)$ OC_2H_5 per 100 Gms. CH_3OH . | |
| 0 | 1.023 | 3.61 | 17.8 | 0.956 | 31.18 | 86.76 | |
| 10 | 1.033 | 6.0 | 29.7 | 0.977 | 41.0 | 114.1 | |
| 15 | 1.042 | 15.0 | 74.2 | 0.989 | 47.5 | 132.1 | |
| 20 | 1.060 | 31.0 | 153.3 | 1.000 | 54.5 | 151.7 | |
| 25 | 1.073 | 50.0 | 247.3 | 1.013 | 62.5 | 173.9 | |
| 30 | 1.078 | 65.0 | 321.4 | 1.024 | 72.0 | 200.3 | |
| 40 | 1.065 | 77.0 | 380.7 | 1.045 | 89.0 | 247.7 | |

| Solubility in Ethyl Alcohol. | | | | Solubility in Propyl Alcohol. | | | |
|------------------------------|-----------------------------------|--|--|-----------------------------------|--|--|--|
| t°. | Wt. of 1 cc. Solu- tion. | Mols. $\text{CO}(\text{NH}_2)$ OC_2H_5 per 100 Mols. $\text{C}_2\text{H}_5\text{OH}$. | Gms. $\text{CO}(\text{NH}_2)$ OC_2H_5 per 100 Gms. $\text{C}_2\text{H}_5\text{OH}$. | Wt. of 1 cc. Solu- tion. | Mols. $\text{CO}(\text{NH}_2)$ OC_2H_5 per 100 Mols. $\text{C}_3\text{H}_7\text{OH}$. | Gms. $\text{CO}(\text{NH}_2)$ OC_2H_5 per 100 Gms. $\text{C}_3\text{H}_7\text{OH}$. | |
| 0 | 0.8914 | 23.91 | 46.26 | 0.880 | 19.48 | 28.9 | |
| 10 | 0.930 | 36.0 | 69.6 | 0.906 | 31.0 | 46.0 | |
| 15 | 0.950 | 43.0 | 89.2 | 0.923 | 40.0 | 59.3 | |
| 20 | 0.968 | 50.0 | 96.7 | 0.942 | 51.0 | 75.7 | |
| 25 | 0.985 | 59.0 | 114.1 | 0.963 | 60.0 | 89.0 | |
| 30 | 1.001 | 70.0 | 135.4 | 0.983 | 68.0 | 100.9 | |
| 40 | 1.035 | 88.0 | 170.2 | 1.025 | 85.0 | 126.1 | |

| Solubility in Chloroform. | | | | Solubility in Toluene. | | | |
|---------------------------|-----------------------------------|--|--|-----------------------------------|--|--|--|
| t°. | Wt. of 1 cc. Solu- tion. | Mols. $\text{CO}(\text{NH}_2)$ OC_2H_5 per 100 Mols. CHCl_3 . | Gms. $\text{CO}(\text{NH}_2)$ OC_2H_5 per 100 Gms. CHCl_3 . | Wt. of 1 cc. Solu- tion. | Mols. $\text{CO}(\text{NH}_2)$ OC_2H_5 per 100 Mols. $\text{C}_6\text{H}_5\text{CH}_3$. | Gms. $\text{CO}(\text{NH}_2)$ OC_2H_5 per 100 Gms. $\text{C}_6\text{H}_5\text{CH}_3$. | |
| 0 | 1.404 | 27.56 | 20.6 | 0.887 | 1.77 | 1.71 | |
| 10 | 1.340 | 41 | 30.6 | 0.874 | 5.0 | 4.84 | |
| 15 | 1.310 | 46 | 34.4 | 0.875 | 10.0 | 9.68 | |
| 20 | 1.280 | 53 | 39.6 | 0.883 | 16.0 | 15.48 | |
| 25 | 1.240 | 60 | 44.8 | 0.902 | 25.0 | 24.18 | |
| 30 | 1.203 | 67 | 50.0 | 0.927 | 44.0 | 42.58 | |
| 40 | 1.125 | 80 | 59.7 | 0.995 | 85.0 | 82.24 | |

URIC ACID $\text{C}_5\text{H}_4\text{N}_4\text{O}_3$. SOLUBILITY IN WATER.

(Blarez and Deniges — Compt. rend. 104, 1847, '87; at 15° Magnier — Bull. Soc. chim. [2] 23, 483, '75.)

| t°. | Gms. $\text{C}_5\text{H}_4\text{N}_4\text{O}_3$ per 100 Gms. H_2O . | t°. | Gms. $\text{C}_5\text{H}_4\text{N}_4\text{O}_3$ per 100 Gms. H_2O . | t°. | Gms. $\text{C}_5\text{H}_4\text{N}_4\text{O}_3$ per 100 Gms. H_2O . |
|-----|---|-----|---|-----|---|
| 0 | 0.002 | 30 | 0.0088 | 70 | 0.0305 |
| 10 | 0.0037 | 40 | 0.0122 | 80 | 0.0390 |
| 15 | 0.0053 | 50 | 0.0170 | 90 | 0.0498 |
| 20 | 0.006 | 60 | 0.0230 | 100 | 0.0625 |

VALERIANIC ACID n $\text{CH}_3(\text{CH}_2)_3\text{COOH}$ (n Propyl acetic acid — Pentane acid) when shaken with water at 16° two layers are formed.

100 gms. of the aqueous layer contains 3.4 gms. $\text{CH}_3(\text{CH}_2)_3\text{COOH}$.

100 gms. of the acid layer contains 90.4 gms. $\text{CH}_3(\text{CH}_2)_3\text{COOH}$.

(Lieben and Rossi — Liebig's Ann. 159, 60, '71.)

YTTRIUM IODATE $\text{Y}(\text{IO}_3)_3 \cdot 3\text{H}_2\text{O}$.

100 gms. H_2O dissolve 0.53 gm. yttrium iodate.

(Berlin.)

YTTRIUM SULPHATE $\text{Y}_2(\text{SO}_4)_3$.

100 gms. H_2O dissolve 15.2 gms. $\text{Y}_2(\text{SO}_4)_3$ at ord. temperature, 9.3 gms. $\text{Y}_2(\text{SO}_4)_3 \cdot 8\text{H}_2\text{O}$ at ord. temp. and 4.8 gms. $\text{Y}_2(\text{SO}_4)_3 \cdot 8\text{H}_2\text{O}$ at 100° .

(Cleve — Bull. soc. chim. [2] 21, 344, '74.)

YTTERBIUM SULPHATE $\text{Yb}_2(\text{SO}_4)_3 \cdot 8\text{H}_2\text{O}$.

SOLUBILITY IN WATER.

(Cleve — Z. anorg. Chem. 32, 143, '02.)

| t°. | Gms. $\text{Yb}_2(\text{SO}_4)_3$ per 100 gms. H_2O . | t°. | Gms. $\text{Yb}_2(\text{SO}_4)_3$ per 100 Gms. H_2O . | t°. | Gms. $\text{Yb}_2(\text{SO}_4)_3$ per 100 Gms. H_2O . |
|------|---|-----|---|-----|---|
| 0 | 44.2 | 55 | 11.5 | 80 | 6.92 |
| 15.5 | 34.6 | 60 | 10.4 | 90 | 5.83 |
| 35 | 19.1 | 70 | 7.22 | 100 | 4.67 |

ZINC ACETATE $\text{Zn}(\text{CH}_3\text{COO})_2 \cdot 2\text{H}_2\text{O}$.

100 gms. H_2O dissolve 40 gms. at 25° and 66.6 gms. at b. pt.

100 gms. alcohol dissolve 2.8 gms. at 25° and 166.0 gms. at b.pt.

(U. S. P.)

ZINC BENZOATE $\text{Zn}(\text{C}_6\text{H}_5\text{O}_2)_2$.

SOLUBILITY IN WATER.

(Paietta — Gazz. chim. ital. 36, II, 67, '06.)

| t°. | 15.9° | 17° | 27.8° | 31.3° | 37.5° | 49.8° | 59° |
|---|-------|------|-------|-------|-------|-------|------|
| Gms. $\text{Zn}(\text{C}_6\text{H}_5\text{O}_2)_2$ per 100 gms. aq. solution | 2.55 | 2.49 | 2.41 | 2.05 | 1.87 | 1.62 | 1.45 |

ZINC BROMIDE ZnBr_2 .

SOLUBILITY IN WATER.

(Diets — Wiss. Abh. p. 1. Reizhanstalt 3, 431, '00; see also Etard — Ann. chim. phys. [7] 2, 536, '94.)

| t°. | Gms. ZnBr_2 per 100 Gms. Solution. | Mols. ZnBr_2 per 100 Mols. H_2O . | Solid Phase. | t°. | Gms. ZnBr_2 per 100 Gms. Solution. | Mols. ZnBr_2 per 100 Mols. H_2O . | Solid Phase. |
|-----|---|--|---|-----|---|--|---|
| -15 | 77.13 | 27.0 | $\text{ZnBr}_2 \cdot 3\text{H}_2\text{O}$ | 25 | 82.46 | 37.6 | $\text{ZnBr}_2 \cdot 2\text{H}_2\text{O}$ |
| -10 | 78.45 | 29.1 | " | 30 | 84.08 | 42.3 | " |
| -5 | 80.64 | 33.3 | " | 37 | 86.20 | 50.0 | " |
| -8 | 79.06 | 30.2 | $\text{ZnBr}_2 \cdot 2\text{H}_2\text{O}$ | 35 | 85.45 | 46.9 | ZnBr_2 |
| 0 | 79.55 | 31.1 | " | 40 | 85.53 | 47.4 | " |
| +13 | 80.76 | 33.5 | " | 60 | 86.08 | 49.5 | " |
| 18 | 81.46 | 35.1 | " | 80 | 86.57 | 51.5 | " |
| | | | | 100 | 87.05 | 53.8 | " |

ZINC CARBONATE ZnCO_3 .

One liter H_2O dissolves 0.01 gm. at 15° .

One liter aq. 5.85 per cent NaCl solution dissolves 0.0586 gm. at 14° .

One liter aq. 7.45 per cent NaCl solutions dissolves 0.0477 gm. at 14° .

(Cantoni and Passamanik — Ann. chim. anal. appl. 10, 258, '05.)

ZINC CHLORATE ZnClO_3 .

SOLUBILITY IN WATER.

(Mensser — Ber. 35, 1417, '02; at 18° ; Mylius and Funk — Ber. 30, 1718, '97.)

| t° . | Gms. $\text{Zn}(\text{ClO}_3)_2$ per 100 Gms. Solution. | Mols. $\text{Zn}(\text{ClO}_3)_2$ per 100 Mols. H_2O . | Solid Phase. | t° . | Gms. $\text{Zn}(\text{ClO}_3)_2$ per 100 Gms. Solution. | Mols. $\text{Zn}(\text{ClO}_3)_2$ per 100 Mols. H_2O . | Solid Phase. |
|-------------|--|---|---|-------------|--|---|---|
| -18 | 55.62 | 9.70 | $\text{Zn}(\text{ClO}_3)_2 \cdot 6\text{H}_2\text{O}$ | 30 | 76.66 | 16.20 | $\text{Zn}(\text{ClO}_3)_2 \cdot 4\text{H}_2\text{O}$ |
| 0 | 59.19 | 11.08 | " | 40 | 69.06 | 17.29 | " |
| 8 | 60.20 | 11.72 | " | 55 | 75.44 | 24.00 | " |
| 15 | 67.32 | 15.96 | " | Ice curve | | | |
| 18 | 66.52 | 15.39 | $\text{Zn}(\text{ClO}_3)_2 \cdot 4\text{H}_2\text{O}$ | -13 | 30.27 | 3.36 | Ice |
| | | | | -9 | 26.54 | 2.80 | " |

Sp. Gr. of solution saturated at 18° = 1.916.

ZINC CHLORIDE ZnCl_2 .

SOLUBILITY IN WATER.

(Mylius and Dietz — Z. anorg. Chem. 44, 217, '05; see also Dietz — Wiss. Abh. p. t. Reichsanstalt 3, 429, '00; Etard — Ann. chim. phys. [7] 2, 536, '94.)

| t° . | Gms. ZnCl_2 per 100 Gms. | | Solid Phase. | t° . | Gms. ZnCl_2 per 100 Gms. | | Solid Phase. |
|-------------|-----------------------------------|-----------|---|-------------|-----------------------------------|-----------|--|
| | Water. | Solution. | | | Water. | Solution. | |
| -5 | 14 | 12.3 | Ice | 9 | 360 | 78.3 | $.2\frac{1}{2}\text{H}_2\text{O} + \text{H}_2\text{O}$ |
| -10 | 25 | 20.0 | " | 6 | 385 | 79.4 | $\text{ZnCl}_2 \cdot 2\frac{1}{2}\text{H}_2\text{O}$ |
| -40 | 83 | 45.3 | " | 6 | 298 | 74.9 | $\text{ZnCl}_2 \cdot 1\frac{1}{2}\text{H}_2\text{O}$ |
| -62 | 104 | 51.0 | $\text{Ice} + \text{ZnCl}_2 \cdot 4\text{H}_2\text{O}$ | 10 | 330 | 76.8 | " |
| -50 | 113 | 53.0 | $\text{ZnCl}_2 \cdot 4\text{H}_2\text{O}$ | 20 | 368 | 78.6 | " |
| -40 | 127 | 55.9 | " | 26 | 423 | 80.9 | $.1\frac{1}{2}\text{H}_2\text{O} + \text{ZnCl}_2 \cdot \text{H}_2\text{O}$ |
| -30 | 160 | 61.5 | $.4\text{H}_2\text{O} + .3\text{H}_2\text{O}$ | 26.3 | 433 | 81.2 | $.1\frac{1}{2}\text{H}_2\text{O} + \text{ZnCl}_2$ |
| -10 | 180 | 65.4 | $\text{ZnCl}_2 \cdot 3\text{H}_2\text{O}$ | 0 | 342 | 77.4 | $\text{ZnCl}_2 \cdot \text{H}_2\text{O}$ |
| 0 | 208 | 67.5 | " | 10 | 364 | 78.4 | " |
| +5 | 230 | 69.7 | " | 20 | 396 | 79.8 | " |
| 6.5 | 252.4 | 71.6 | " | 28 | 436 | 81.3 | $\text{ZnCl}_2 \cdot \text{H}_2\text{O} + \text{ZnCl}_2$ |
| 5 | 282 | 73.8 | " | 31 | 477 | 82.7 | $\text{ZnCl}_2 \cdot \text{H}_2\text{O}$ |
| 0 | 309 | 75.5 | $.3\text{H}_2\text{O} + .1\frac{1}{2}\text{H}_2\text{O}$ | 25 | 432 | 81.2 | ZnCl_2 |
| 0 | 235 | 70.1 | $\text{ZnCl}_2 \cdot 2\frac{1}{2}\text{H}_2\text{O}$ | 40 | 452 | 81.9 | " |
| 6.5 | 252 | 71.6 | $.2\frac{1}{2}\text{H}_2\text{O} + .3\text{H}_2\text{O}$ | 60 | 488 | 83.0 | " |
| 10 | 272 | 73.1 | $\text{ZnCl}_2 \cdot 2\frac{1}{2}\text{H}_2\text{O}$ | 80 | 543 | 84.4 | " |
| 12.5 | 303 | 75.2 | " | 100 | 615 | 86.0 | " |
| 11.5 | 335 | 77.0 | $.2\frac{1}{2}\text{H}_2\text{O} + .1\frac{1}{2}\text{H}_2\text{O}$ | 262 | ∞ | 100.0 | " |

ZINC CYANIDE $\text{Zn}(\text{CN})_2$.

100 cc. concentrated $\text{Zn}(\text{C}_2\text{H}_3\text{O}_2)_2$ + Aq. dissolve 0.4 gm. $\text{Zn}(\text{CN})_2$.

100 cc. concentrated ZnSO_4 + Aq. dissolves 0.2 gm. (Joannis.)

SOLUBILITY OF ZINC CHLORIDE, AMMONIUM CHLORIDE MIXTURES IN WATER.

(Meerburg — Z. anorg. Chem. 37, 212, '03.)

| Isotherm for 0°. | | | Isotherm for 20°. | | | Isotherm for 30°. | | |
|-----------------------------|---------------------|------------------------|-----------------------------|---------------------|------------------------|-----------------------------|---------------------|------------------------|
| Gms. per 100 Gms. Solution. | | Solid Phase. | Gms. per 100 Gms. Solution. | | Solid Phase. | Gms. per 100 Gms. Solution. | | Solid Phase. |
| ZnCl ₂ . | NH ₄ Cl. | | ZnCl ₂ . | NH ₄ Cl. | | ZnCl ₂ . | NH ₄ Cl. | |
| 0 | 22.8 | NH ₄ Cl | 0.0 | 26.9 | NH ₄ Cl | 0.0 | 29.5 | NH ₄ Cl |
| 3.5 | 23.0 | " | 5.1 | 27.1 | " | 9.2 | 29.4 | " |
| 7.1 | 23.5 | " | 9.5 | 27.4 | " | 16.0 | 29.7 | " |
| 10.2 | 23.9 | " | 12.7 | 27.5 | " | 20.2 | 30.1 | " |
| 15.1 | 24.7 | " | 15.7 | 27.7 | " | 24.7 | 30.4 | " |
| 18.0 | 25.3 | " | 18.0 | 27.9 | " | 26.3 | 30.8 | NH ₄ Cl + a |
| 22.4 | 26.0 | " | 23.5 | 29.0 | " | 27.2 | 30.2 | a |
| 24.2 | 26.1 | " | 26.0 | 29.5 | NH ₄ Cl + a | 30.1 | 29.6 | " |
| 25.7 | 26.3 | NH ₄ Cl + a | 29.5 | 28.1 | a | 36.8 | 28.2 | " |
| 27.5 | 26.4 | a | 32.3 | 27.7 | " | 42.4 | 27.3 | " |
| 30.7 | 25.7 | " | 35.8 | 27.0 | " | 43.8 | 27.3 | a + b |
| 33.9 | 25.3 | " | 38.7 | 26.9 | " | 45.0 | 24.4 | b |
| 38.8 | 24.4 | " | 40.2 | 26.6 | " | 51.2 | 17.6 | " |
| 42.6 | 24.6 | a + b | 41.9 | 26.3 | " | 61.9 | 10.4 | " |
| 44.3 | 21.3 | b | 43.2 | 26.0 | a + b | 66.9 | 9.2 | ZnCl ₂ + b |
| 49.2 | 15.3 | " | 46.9 | 21.0 | b | 75.6 | 6.1 | ZnCl ₂ |
| 52.6 | 11.9 | " | 53.2 | 14.5 | " | 70.3 | 7.6 | " |
| 55.4 | 10.0 | " | 58.4 | 11.1 | " | 78.5 | 3.2 | " |
| 59.3 | 7.5 | " | 62.7 | 8.7 | " | 76.9 | 3.5 | " |
| 62.1 | 6.8 | " | 66.6 | 7.9 | " | 79.8 | 1.6 | " |
| | | | | | | 81.6 | 0.0 | " |

a = ZnCl₂·3NH₄Cl. b = ZnCl₂·2NH₄Cl.100 gms. abs. acetone dissolve 43.5 gms. ZnCl₂ at 18°.

(Naumann — Ber. 37, 433a, '04.)

100 gms. glycerine dissolve 50 gms. ZnCl₂ at 15.5°.

ZINC FLUORIDE ZnF₂·4H₂O.

One liter of water dissolves 16 gms. at 18°.

(Diets.)

ZINC HYDROXIDE Zn(OH)₂.

One liter of water dissolves 0.0042 gm. ZnO at 18°, conductivity method.

(Dupre and Bratas — Z. angew. Chem. 16, 55, '03.)

SOLUBILITY OF ZINC HYDROXIDE IN ONE PER CENT AQUEOUS SALT SOLUTIONS AT 16°-20°.

(Snyder — Ber. 11, 936, '78.)

The CO₂ free Zn(OH)₂ dissolved is calculated as milligrams Zn per liter of the given salt solution. Additional determinations are also given.

| Aq. Salt Solution. | Mgs. Zn per Liter Solution. | Aq. Salt Solution. | Mgs. Zn per Liter Solution. | Aq. Salt Solution. | Mgs. Zn per Liter Solution. |
|--------------------|-----------------------------|-----------------------------------|-----------------------------|---|-----------------------------|
| NaCl | 51 | K ₂ SO ₄ | 37.5 | K ₂ CO ₃ | 0 |
| KCl | 43 | MgSO ₄ | 27 | NH ₄ Cl | 95 |
| CaCl ₂ | 57.5 | KNO ₃ | 17.5 | NH ₄ NO ₃ | 77 |
| MgCl ₂ | 65 | Ba(NO ₃) ₂ | 25 | (NH ₄) ₂ SO ₄ | 88 |
| BaCl ₂ | 38 | | | | |

SOLUBILITY OF ZINC HYDROXIDE IN AQUEOUS SOLUTIONS OF:
Ammonia and Ammonia Bases Sodium Hydroxide at
at 17°-19° Ord. Temp.

(Herz — Z. anorg. Chem. 30, 281, '02.)

(Rubenbauer — *Ibid.* 30, 333, '02.)

| Normality of the Base. | Normality of Dis- solved Zn. | Gms. ZnO per 20 cc. Solution. | Gms. per 20 cc. Solution | | Mol. Dilution of the NaOH. |
|---|------------------------------------|-------------------------------------|---|--------|----------------------------------|
| | | | Na. | Zn. | |
| 0.0942NH ₃ | 0.0011 | 0.00185 | 0.1012 | 0.0040 | 4.50 |
| 0.236 " | 0.0110 | 0.0180 | 0.1978 | 0.0150 | 2.33 |
| 0.707 " | 0.059 | 0.0958 | 0.4278 | 0.0442 | 1.06 |
| 0.0944NH ₂ CH ₃ | 0.0005 | 0.0008 | 0.6670 | 0.1771 | 0.70 |
| 0.472 " | 0.0081 | 0.0132 | 0.9660 | 0.0630 | 0.48 |
| 0.944 " | 0.03 | 0.0484 | 1.4951 | 0.2481 | 0.31 |
| 0.068 NH ₂ C ₂ H ₅ | 0.0003 | 0.0005 | 2.9901 | 0.3700 | 0.16 |
| 0.51 " | 0.0045 | 0.0074 | Moist Zn (OH) ₂ used. So- lutions shaken 5 hours. | | |
| 0.68 " | 0.0098 | 0.0161 | | | |

ZINC IODATE Zn(IO₃)₂.100 gms. H₂O dissolve 0.87 gm. Zn(IO₃)₂, cold and 1.31 gms. hot.

(Rammelsberg — Pogg. Ann. 43, 665, '38.)

ZINC IODIDE ZnI₂.

SOLUBILITY IN WATER.

(Dietz — Wiss. Abh. p. t. Reichanstalt 3, 432, '00; see also Etard — Ann. chim. phys. [7] 2, 526, '94.)

| t°. | Gms. ZnI ₂ per 100 Gms. Solution. | Mols. ZnI ₂ per 100 Mols. H ₂ O. | Solid Phase. | t°. | Gms. ZnI ₂ per 100 Gms. Solution. | Mols. ZnI ₂ per 100 Mols. H ₂ O. | Solid Phase. |
|-----|--|--|-------------------------------------|-----|--|--|------------------|
| -10 | 80.50 | 23.3 | ZnI ₂ ·2H ₂ O | 0 | 81.11 | 24.2 | ZnI ₂ |
| -5 | 80.77 | 23.7 | " | 18 | 81.20 | 24.4 | " |
| 0 | 81.16 | 24.3 | " | 40 | 81.66 | 25.1 | " |
| +10 | 82.06 | 25.8 | " | 60 | 82.37 | 26.4 | " |
| 22 | 83.12 | 27.8 | " | 80 | 83.05 | 27.5 | " |
| 27 | 89.52 | 50.3 | " | 100 | 83.62 | 28.7 | " |

Sp. Gr. of sat. solution of the anhydrous salt at 18° = 2.725.

100 gms. glycerine dissolve 40 gms. ZnI₂ at 15.5°.**ZINC NITRATE** Zn(NO₃)₂.

SOLUBILITY IN WATER.

(Funk — Wiss. Abh. p. t. Reichanstalt, 3, 436, '00.)

| t°. | Gms. Zn(NO ₃) ₂ per 100 Gms. Solution. | Mols. Zn(NO ₃) ₂ per 100 Mols. H ₂ O. | Solid Phase. | t°. | Gms. Zn(NO ₃) ₂ per 100 Gms. Solution. | Mols. Zn(NO ₃) ₂ per 100 Mols. H ₂ O. | Solid Phase. |
|-------|--|--|--|------|--|--|--|
| -25 | 40.12 | 6.36 | Zn(NO ₃) ₂ ·9H ₂ O | 18 | 53.50 | 10.9 | Zn(NO ₃) ₂ ·6H ₂ O |
| -22.5 | 40.75 | 6.54 | " | 25 | 55.90 | 12.0 | " |
| -20 | 42.03 | 6.89 | " | 36.4 | 63.63 | 16.7 | " |
| -18 | 43.59 | 7.34 | " | 36 | 64.63 | 17.4 | " |
| -18 | 44.63 | 7.67 | Zn(NO ₃) ₂ ·6H ₂ O | 33.5 | 65.83 | 18.3 | " |
| -15 | 45.26 | 7.86 | " | 37 | 66.38 | 18.8 | Zn(NO ₃) ₂ ·3H ₂ O |
| -13 | 45.51 | 7.94 | " | 40 | 67.42 | 19.7 | " |
| -12 | 45.75 | 8.01 | " | 41 | 68.21 | 20.4 | " |
| 0 | 48.66 | 9.01 | " | 43 | 69.26 | 21.4 | " |
| +12.5 | 52.0 | 10.3 | " | 45.5 | 77.77 | 33.3 | " |

ZINC OXALATE

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ZINC OXALATE $\text{ZnC}_2\text{O}_4 \cdot 2\text{H}_2\text{O}$.

One liter of water dissolve 0.083 Mg. equiv. = 0.0064 gm. ZnC_2O_4 at 18°.

(Kohlrausch — Z. physik. Chem. 50, 356, '04-'05.)

ZINC SULPHATE ZnSO_4 .**SOLUBILITY IN WATER.**

(Cohen — Z. physik. Chem. 34, 189, '00; at 50°; Callender and Barnes — Proc. Roy. Soc. 62, 149, '97; Etard — Ann. chim. phys. [7] 2, 536, '94; Poggiale *Ibid.* [3] 8, 467, '43; Mulder.)

| t°. | Gms. ZnSO_4 per 100 Gms. | | Solid Phase. | t°. | Gms. ZnSO_4 per 100 Gms. | | Solid Phase. |
|-----|-----------------------------------|--------|---|-----|-----------------------------------|--------|--|
| | Solution. | Water. | | | Solution. | Water. | |
| — 5 | 28.21 | 39.30 | $\text{ZnSO}_4 \cdot 7\text{H}_2\text{O}$ | 25 | 38.94 | 63.74 | $\text{ZnSO}_4 \cdot 6\text{H}_2\text{O}$ |
| 0.1 | 29.54 | 41.93 | " | 39 | 41.22 | 70.06 | $6\text{H}_2\text{O} + .7\text{H}_2\text{O}$ |
| 9.1 | 32.01 | 47.09 | " | 50 | 43.45 | 76.84 | $\text{ZnSO}_4 \cdot 6\text{H}_2\text{O}$ |
| 15 | 33.81 | 50.88 | " | 70 | 47.5 | 88.7 | $6\text{H}_2\text{O} + \text{H}_2\text{O}$ |
| 25 | 36.67 | 57.90 | " | 80 | 46.4 | 86.6 | $\text{ZnSO}_4 \cdot \text{H}_2\text{O}$ |
| 35 | 39.98 | 66.61 | " | 90 | 45.5 | 83.7 | " |
| 39 | 41.21 | 70.05 | " | 100 | 44.7 | 80.8 | " |
| — 5 | 32.00 | 47.08 | $\text{ZnSO}_4 \cdot 6\text{H}_2\text{O}$ | 120 | 41.7 | 71.5 | " |
| 01 | 33.09 | 49.48 | " | 140 | 38.0 | 61.3 | " |
| | | | | 160 | 33.0 | 49.3 | " |

100 gms. abs. methyl alcohol dissolve 0.65 gm. ZnSO_4 at 18°, 5.90 gms. $\text{ZnSO}_4 \cdot 7\text{H}_2\text{O}$ at 18°.

100 gms. 50 per cent methyl alcohol dissolve 15.7 gms. $\text{ZnSO}_4 \cdot 7\text{H}_2\text{O}$ at 18°.

(de Bruyn — Z. physik. Chem. 10, 783, '92.)

SOLUBILITY OF ZINC SULPHATE IN AQUEOUS ETHYL ALCOHOL.

(Schiff — Liebig's Ann. 118, 365, '61.)

| Concentration of Alcohol | 10 per cent | 20 per cent | 40 per cent |
|--|-------------|-------------|-------------|
| Gms. $\text{ZnSO}_4 \cdot 7\text{H}_2\text{O}$ per 100 | | | |
| Gms. Solution | 51.1 | 39.0 | 3.45 |

100 gms. glycerine dissolve 35 gms. zinc sulphate at 15.5°.

SOLUBILITY OF ZINC SULPHATE — SODIUM SULPHATE MIXTURES IN WATER.

(Koppel — Gumpert — Z. physik. Chem. 52, 409, '05.)

| t°. | Gms. per 100 Gms. Solution. | | Gms. per 100 Gms. H ₂ O. | | Mols. per 100 Mols. H ₂ O. | | Solid Phase. |
|-----|--------------------------------|-----------------------------------|--|-----------------------------------|--|-----------------------------------|---|
| | ZnSO ₄ . | Na ₂ SO ₄ . | ZnSO ₄ . | Na ₂ SO ₄ . | ZnSO ₄ . | Na ₂ SO ₄ . | |
| 0 | 27.19 | 5.33 | 40.30 | 7.90 | 4.50 | 1.01 | ZnSO ₄ ·7H ₂ O + Na ₂ SO ₄ ·10H ₂ O |
| 5 | 27.85 | 6.27 | 42.28 | 9.52 | 4.71 | 1.21 | |
| 25 | 17.58 | 15.63 | 26.32 | 23.40 | 2.94 | 2.96 | ZnNa ₂ (SO ₄) ₂ ·4H ₂ O |
| 30 | 17.66 | 15.58 | 26.47 | 23.44 | 2.95 | 2.97 | " |
| 35 | 17.59 | 15.70 | 26.36 | 23.52 | 2.94 | 2.98 | " |
| 40 | 17.75 | 15.72 | 26.68 | 23.63 | 2.98 | 2.99 | " |
| 10 | 29.16 | 7.16 | 45.79 | 11.24 | 5.11 | 1.42 | ZnNa ₂ (SO ₄) ₂ ·4H ₂ O + ZnSO ₄ ·7H ₂ O |
| 15 | 30.70 | 6.40 | 48.81 | 10.17 | 5.45 | 1.29 | |
| 20 | 32.51 | 5.36 | 52.34 | 8.62 | 5.84 | 1.09 | |
| 25 | 34.36 | 4.41 | 56.15 | 7.22 | 6.27 | 0.91 | |
| 30 | 36.28 | 3.80 | 60.55 | 6.34 | 6.76 | 0.81 | ZnNa ₂ (SO ₄) ₂ ·4H ₂ O + ZnSO ₄ ·6H ₂ O |
| 35 | 38.18 | 3.30 | 65.25 | 5.64 | 7.28 | 0.71 | |
| 38 | 38.83 | 2.90 | 66.64 | 4.98 | 7.44 | 0.63 | |
| 40 | 38.26 | 2.78 | 64.89 | 4.71 | 7.24 | 0.60 | |
| 10 | 27.91 | 7.92 | 43.50 | 12.34 | 4.85 | 1.565 | ZnNa ₂ (SO ₄) ₂ ·4H ₂ O + Na ₂ SO ₄ ·10H ₂ O |
| 15 | 24.28 | 10.90 | 36.92 | 16.71 | 4.12 | 2.12 | |
| 20 | 19.14 | 14.58 | 28.77 | 21.95 | 3.21 | 2.79 | |
| 25 | 13.31 | 19.94 | 19.93 | 29.87 | 2.22 | 3.785 | |
| 30 | 6.96 | 27.75 | 10.67 | 42.51 | 1.19 | 5.39 | ZnNa ₂ (SO ₄) ₂ ·4H ₂ O + Na ₂ SO ₄ |
| 35 | 5.61 | 30.03 | 8.72 | 46.61 | 0.971 | 5.91 | |
| 40 | 5.96 | 28.65 | 9.16 | 43.83 | 1.02 | 5.555 | |

ZINC SULPHITE ZnSO₃·2H₂O.

100 gms. H₂O dissolve 0.16 gm. ZnSO₃·2H₂O.

(Houston and Trichborne — Brit. Med. Jour. 1963, '90.)

ZINC TARTRATE C₄H₄O₆·Zn·2H₂O.

SOLUBILITY IN WATER.

(Cantoni and Zachoder — Bull. Soc. chim. [3] 33, 751, '05.)

| t°. | Gms. C ₄ H ₄ O ₆ ·Zn·2H ₂ O per 100 cc. Solution. | t°. | Gms. C ₄ H ₄ O ₆ ·Zn·2H ₂ O per 100 cc. Solution. | t°. | Gms. C ₄ H ₄ O ₆ ·Zn·2H ₂ O per 100 cc. Solution. |
|-----|---|-----|---|-----|---|
| 15 | 0.019 | 40 | 0.060 | 65 | 0.100 |
| 20 | 0.022 | 45 | 0.073 | 70 | 0.088 |
| 25 | 0.036 | 50 | 0.087 | 75 | 0.078 |
| 30 | 0.041 | 55 | 0.116 | 80 | 0.059 |
| 35 | 0.055 | 60 | 0.104 | 85 | 0.041 |

ZINC VALERATE (C₄H₉COO)₂Zn·2H₂O.

100 gms. H₂O dissolve 2 gms. (C₄H₉COO)₂Zn·2H₂O at 25°.

100 gms. alcohol dissolve 2.8 gms. at 25°.

(U. S. P.)

ADDENDUM

The distribution results shown in the following table were obtained by agitating together equal volumes of olive oil and aqueous solutions of the several narcotics, and determining the dissolved substance present in the aqueous layer before and after the agitation. The sum of the amount of substance in the oil and aqueous layers, as shown in the table, is the amount originally in 100 cc. of each aqueous solution used.

The work was done for the purpose of testing the Overton-Meyer Theory of Narcosis, that the anesthetic action of certain groups of narcotics is proportional to their distribution between water and the fatty material occurring in the nervous system, and olive oil was selected as the solvent best fulfilling the analytical requirements and at the same time offering a fair resemblance to the fatty substance of the nervous system. The results are believed to be of interest both as solubility studies and on account of their connection with the Theory of Narcosis.

The author is indebted to Dr. Reid Hunt of the Hygienic Laboratory for calling his attention to the papers containing the distribution results here tabulated.

DISTRIBUTION OF SEVERAL SUBSTANCES BETWEEN WATER AND OLIVE OIL.

(At ord. temp., Baum — Archiv. exp. Pathol. u. Pharmacol., 42, 130, '00; at 3°, 30° and 36°; Meyer — *Ibid.* 46, 344, '01; at 15°, Harrass — Archiv. internat. Pharmacodynamie et Therapie, 11, 458, '03.)

| Name of Substance. | Formula. | t°. | Gms. Substance per 100 cc. | | C(f.) C(w.) |
|--|----------------------------------|------|----------------------------|-----------------------|----------------|
| | | | Water layer (w.). | Olive Oil layer (f.). | |
| Sulfonal | $(CH_3)_2C(SO_2.C_2H_5)_2$ | ord. | 0.0700 | 0.0686 | 0.979 |
| Trional | $(CH_3)(C_2H_5)C(SO_2.C_2H_5)_2$ | " | 0.0404 | 0.1646 | 4.074 |
| Tetronal | $(C_2H_5)_2C(SO_2.C_2H_5)_2$ | " | 0.0462 | 0.1446 | 3.756 |
| Di methyl sulphon di methyl methane | $(CH_3)_2C(SO_2.CH_3)_2$ | " | 0.6072 | 0.0622 | 0.103 |
| Di ethyl sulphon me- thane | $CH_3(SO_2.C_2H_5)_2$ | " | 0.610 | 0.092 | 0.151 |
| Ethyl urethane | $NH_2.CO_2.C_2H_5$ | " | 4.52 | 0.615 | 0.136 |
| Methyl urethane | $NH_2.CO_2.CH_3$ | " | 7.50 | 0.275 | 0.037 |
| Tertiary butyl alcohol | $(CH_3)_3C(OH).CH_3$ | " | 8.744 | 1.539 | 0.176 |
| Amylene hydrate | $(CH_3)_2C(OH).CH_2.CH_3$ | " | 6.605 | 6.605 | 1.000 |
| Mono acetin | $C_2H_5(OH)_2(OC_2H_5O)$ | " | 4.28 | 0.254 | 0.059 |
| " | " | 3 | 2.349 | 0.220 | 0.090 |
| " | " | 36 | 2.417 | 0.161 | 0.066 |
| Di acetin | $C_2H_5(OH)(OC_2H_5O)_2$ | ord. | 3.0 | 0.7 | 0.234 |
| Tri acetin | $C_2H_5(OC_2H_5O)_3$ | " | 2.72 | 0.80 | 0.205 |
| Bromal hydrate | $CB_2CH(OH)_2$ | " | 9.81 | 6.52 | 0.665 |
| Butyl chloral hydrate | $C_4H_9Cl_2.CH(OH)_2$ | " | 2.04 | 3.24 | 1.589 |
| Chloral hydrate | $CCl_2CH(OH)_2$ | " | 16.31 | 3.10 | 0.190 |
| " | " | " | 4.12 | 0.91 | 0.22 |
| " | " | 3 | 1.34 | 0.08 | 0.053 |
| " | " | 30 | 1.15 | 0.27 | 0.237 |
| Salicylamide | $OH.C_6H_4.CH_2NH_2$ | 3 | 0.056 | 0.126 | 2.25 |
| " | " | 36 | 0.075 | 0.107 | 1.40 |
| Benzamide | $C_7H_5ONH_2$ | 3 | 1.062 | 0.706 | 0.66 |
| " | " | 36 | 1.235 | 0.533 | 0.43 |
| Ethyl alcohol | C_2H_5OH | 3 | 2.69 | 0.09 | 0.026 |
| " | " | 3 | 3.90 | 0.07 | |
| " | " | 30 | 2.64 | 0.14 | 0.047 |
| " | " | 30 | 3.82 | 0.16 | |
| Acetone | $(CH_3)_2CO$ | 3 | 3.07 | 0.50 | |
| " | " | 3 | 4.14 | 0.52 | 0.146 |
| " | " | 3 | 3.92 | 0.61 | |
| " | " | 30 | 2.73 | 0.73 | |
| " | " | 30 | 3.86 | 0.81 | 0.235 |
| " | " | 30 | 3.71 | 0.87 | |
| Valeryl di ethyl amide | $CH_3(CH_2)_3CON(C_2H_5)_2$ | 15 | 0.231 | 1.339 | 5.797 |
| Valeryl di methyl amide | $CH_3(CH_2)_3CON(CH_3)_2$ | 15 | 0.911 | 0.379 | 0.416 |
| Valeryl ethyl amide | $CH_3(CH_2)_3CONH(C_2H_5)$ | 15 | 1.029 | 0.261 | 0.254 |
| Valer amide | $CH_3(CH_2)_3CONH_2$ | 15 | 0.769 | 0.241 | 0.313 |
| Lactic acid di ethyl amide | $CH_3.CHOH.CON(C_2H_5)_2$ | 15 | 1.256 | 0.194 | 0.154 |
| Sodium salicylate | $C_6H_4.OH.COONa$ | 15 | 1.444 | 0.156 | 0.108 |

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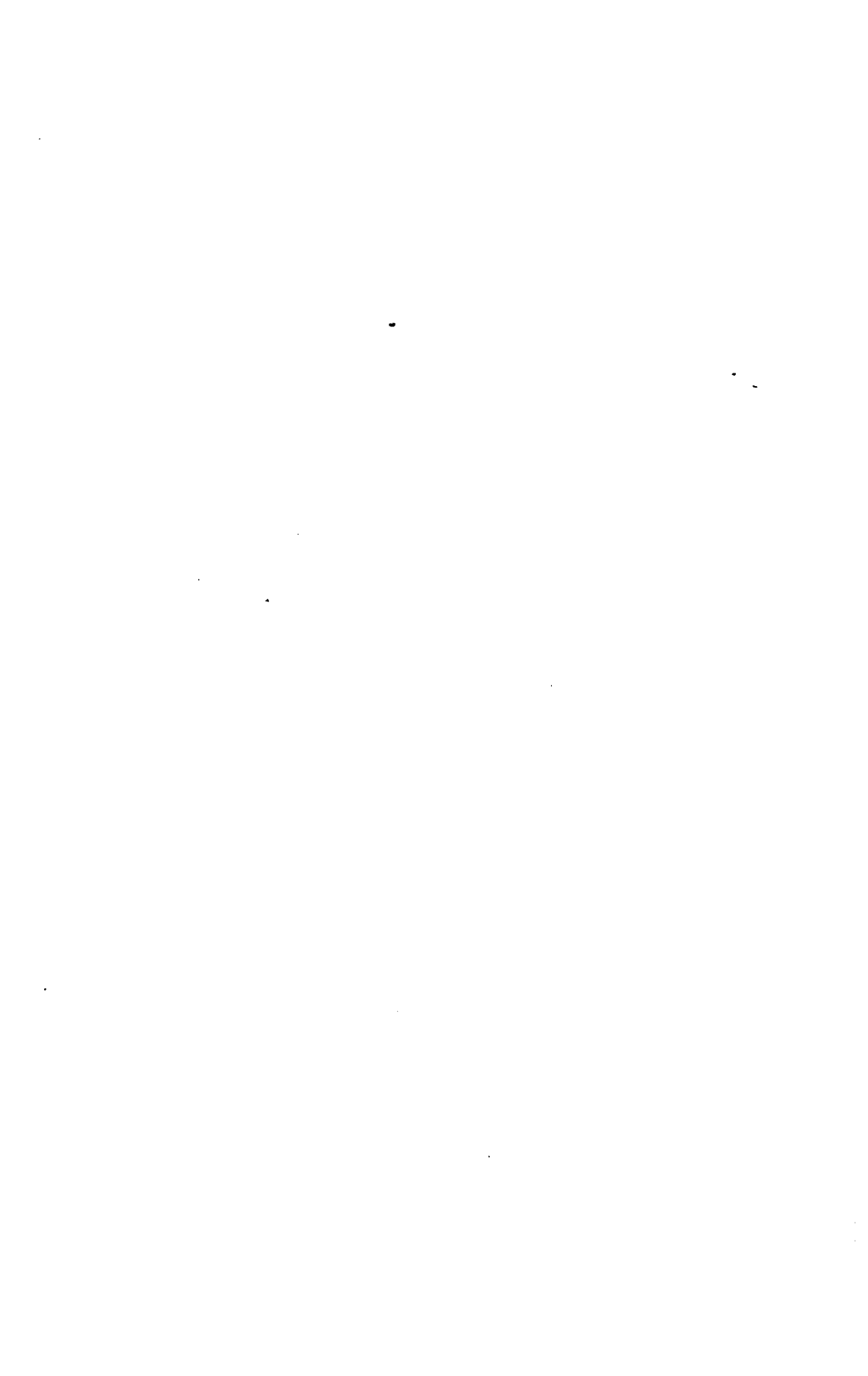
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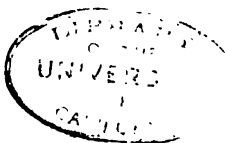
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